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Supreme Court of the United States

October Term, 1929

No. 71

MINERALS SEPARATION NORTH AMERICAN CORPORATION,
Petitioner-Plaintiff,

—vs.—

MAGMA COPPER COMPANY,
Respondent-Defendant.

REPLY BRIEF FOR PETITIONER-PLAINTIFF

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REPLY BRIEF FOR PETITIONER-PLAINTIFF.

First Defense: that the Patent in Suit is anticipated by Patent No. 835,120.

Petitioner's Brief* argues this matter so fully that we shall here only point out some of the errors in Respondent's Brief.

The major error is its use of the phrase "preferential affinity for metalliferous matter" in a wholly wrong sense, unwarranted and false. This error is the very crux and basis of its argument as to anticipation.

The phrase appears in patent No. 835,120 as defining the broad disclosure therein of the oils, etc. of that patent. As this Court said in the *Butte* case in construing that patent (250 U. S. 349):

> "the only disclosure as to the kind * * * of oil which the patentees made to the public as necessary to the practising of their process is that it must be an oil or oily substance, or oily liquid having a 'preferential affinity for metalliferous matter,'"

*References to the "Brief for Petitioner-Plaintiff" will be entitled P. B., and references to the "Brief for Respondent-Defendant" will be entitled R. B. Unless otherwise indicated, bracketted portions and italicizing in quotations will be ours.

The meaning in which this phrase is used appears from other parts of the opinions of this Court in the *Hyde* and *Butte* cases. For example in the *Hyde* case, after quoting the phrase in full from the specification of patent No. 835,120, and referring to the use of oils in the prior art, this Court said (242 U. S. 264):

> "it was well-known that oil and oily substances had a *selective affinity or attraction for, and would unite mechanically with,* the minute particles of metal and metallic compounds found in crushed or powdered ores, but would not so unite with the quartz, or rocky non-metallic material called 'gangue.'"

Again in the *Hyde* case this Court quoted from Lord Atkinson of the House of Lords in *Minerals Separation, Ltd.* v. *British Ore Concentration Syndicate, Ltd.*, as follows (242 U. S. 269):

> "And Lord Atkinson said: 'In their process this *mysterious affinity* of oil for the metallic particles of the ore is availed of, yet the oil is used in such relatively infinitesimal quantities that the metallic particles *are only coated with a thin film of it,* * * * air bubbles, which, * * * envelop or become attached to, the *thinly oiled metallic particles,* and raise them to the surface * * *.'"

And in describing the process of patent No. 835,120, this Court also said in the *Hyde* case (242 U. S. 267):

> "which air, in bubbles, attached itself to the mineral particles, *slightly coated as they were* with what was necessarily an infinitesimal amount of oil, and floated them to the surface."

Respondent's Brief refuses to accept this definition of the phrase "preferential affinity for metalliferous matter" or to use it with this meaning, but on the contrary uses the phrase with another and a different meaning that is born of the exigencies of its case here and that serves the purposes of its argument of anticipation. Thus Respondent's Brief, referring to the decisions of this Court in the *Hyde* case and the *Butte* case, says (R. B., pp. 46, 47):

> "The court, as we read the opinion, was only concerned to know whether or not the particular oils there in question would display preferential affinity for the metalliferous matter *by the practical test of bringing the metalliferous matter to the surface of the pulp.*"

Moreover the meaning in which Respondent's Brief everywhere uses the phrase in question is disclosed in its statement, made as to amyl acetate (R. B., p. 29):

> "it forms a mineral-bearing froth, *thereby* displaying its preferential affinity for metalliferous matter over gangue."

In other words, Respondent's Brief defines the phrase "preferential affinity for metalliferous matter" as synonymous with "forming a mineral-bearing froth."

This defines the phrase by the *ultimate result* of the operation (i. e., the mineral-bearing froth) and disregards the *function* or *means* by which that result is reached (i. e., the preferential coating of the metalliferous matter) and the *quality of the agent* that leads to that preferential coating (i. e., its preferential affinity for metalliferous matter) and the accompanying quality of insolubility of the agent that is absolutely essential to the formation and persistence of any coating whatever.

This error of definition is an argumentative artifice which improperly expands the disclosure of patent No. 835,120 and endeavors thereby to bridge the gulf between the two patents and indeed begs the whole question of anticipation, and at the same time it seeks to avoid and destroy the effect of the decision of this Court as to the disclosure of patent No. 835,120.

That the phrase in question is used in patent No. 835,120 in the meaning that we give and not in the meaning given in Respondent's Brief, is manifest from the repeated references in specification and in claims to the preferential coating of the mineral particles and to the lifting of the coated particles by the air bubbles into a froth (P. B., p. 12, foot note).

That the phrase in question was used by this Court in the *Hyde* and *Butte* opinions with the meaning that we give and

not with the meaning given in Respondent's Brief, appears from the repeated references in those opinions to the coating of the mineral particles and is sufficiently indicated by the quotations therefrom above given (See also P. B., pp. 4-7).

Obviously to the end that the oil or oily substance or oily liquid of patent No. 835,120 may exercise preferential affinity in the pulp and preferentially coat (unite mechanically with) the metalliferous mineral particles, the substance must be insoluble in the water of the pulp. As the Circuit Court of Appeals for the Third Circuit said in the *Miami* case (244 Fed. at 773):

> "The difference between the two patents may be shortly stated to be this: The first process rests upon the use in very small quantity of an oily substance that does not dissolve in water, coupled * * *. The second process does not employ oil, or an undissolvable substance; on the contrary, the 'mineral frothing agent' must be in solution, and *ex vi termini* must therefore be dissolvable."

To support its false position in this matter, Respondent's Brief builds up a tissue of errors as to facts and gross distortions as to the meaning of technical terms in the art.

Faced with the repeated references in patent No. 835,120, and its claims, to the *oil-coating* of the metal particles, and with the characterization by this Court of the selective affinity or attraction as *uniting the oil mechanically with the minute particles of metal,* Respondent invokes the theory of *adsorption* and, contrary to the proved facts, asserts that the soluble mineral-frothing agents of the patent in suit, No. 962,678, unite mechanically with the minute particles of the metal and coat them, just as do the oils and oily substances of 835,120. This theory was completely discredited in the proofs and is sufficiently discussed in Petitioner's Brief at pages 64-70.

That the oils or oily substances of 835,120 must be *insoluble* in the water of the pulp in order to exercise preferential affinity for, and unite mechanically with, the minute particles of metal, is obvious. Nevertheless Respondent's Brief expends much ef-

fort to show that insolubility was not disclosed in that patent because the word insoluble or an equivalent word does not there appear. It says (R. B., p. 35):

> "The word 'insoluble' does not occur either in the specification or in the claims of patent 835,120. Nor is there any equivalent word therein, * * *."

Again (R. B., p. 34):

> "Neither the word 'insoluble' nor any similar word is found in patent 835,120."

Why use the word "insoluble," or its equivalent, when speaking of oils or oily substances? It would be just as unnecessary as adding the word "sweet" to sugar in order to define what was meant. The insolubility of oil and oily substances was and is well known to all.

The first dictionary we turn to, namely, "The Practical Standard Dictionary. Funk & Wagnalls. 1930" gives as the first definition of "Oil" as a noun:

> "1. A greasy or unctuous liquid, of vegetable, animal or mineral origin, insoluble in water but sometimes soluble in alcohol, and always in ether."

A study of the concentration of ore by the use of oil or oily substances from the time of Herodotus down to the time of patent No. 835,120 discloses that it is the insolubility of oil and oily substances that enables it to exercise its preferential affinity for metalliferous matter over gangue in a watery pulp. Without insolubility, preferential affinity for metalliferous matter would be vain, and mechanical uniting with the minute particles of metal to coat them would be impossible.

Herodotus tells of virgins on a certain island smearing pitch on feathers and rubbing the feathers in sand at the bottom of the lake whereby particles of gold from the sand stuck to the pitch and were thus collected. If the pitch had been soluble in the water of the lake it would have been washed off by the

water and the gold would not have stuck to the feathers. This is equally true of all efforts to recover metalliferous matter from ore by the preferential affinity of oils and oily substances for metalliferous matter. In each and every instance insolubility has been a prerequisite and a *sine qua non* and has been sought as such and this has gone without saying. When it is considered, therefore, that the patentees of 835,120 were addressing men skilled in the art, it will be appreciated that the addition of the word "insoluble" or its equivalent was quite unnecessary and would have been quite redundant. The word "immiscible" equivalent to "insoluble" is used in the patent in suit, No. 962,678, because the novel and astonishing idea there disclosed is the contrasted solubility of the mineral-frothing agent.

It was proved at the trial that in the process of patent No. 835,120 the active principle in producing the mineral-bearing froth is found in the coating of oil or oily substance that was mechanically united with the minute particles of metal, whereas in the case of the process of the patent in suit the active principle is found in the water of the pulp, the agent in solution modifying the water in such a way as to produce a mineral froth bearing uncoated mineral particles (P. B., pp. 9-11).

Faced with this situation, Respondent propounds the theory which is stated on page 58 of its Brief:

> "The fact is also known that all substances which produce froth contain a soluble constituent.
>
> "The modern theory is that the froth formation is dependent upon the modification of the water by the soluble constituent, * * *."

There is absolutely no justification in the record for either of these statements insofar as concerns the oils and oily substances of patent No. 835,120. The evidence is exactly to the contrary. Respondent's experts started out to prove that oleic acid, the agent that is specifically disclosed in patent No. 835,120, was partly soluble (and the Circuit Court of Appeals for the First Circuit erroneously ascribed its mineral-froth

forming power to this solubility[1]) but on cross examination the effort broke down, for it appeared from the testimony of defendant's experts that the solubility of oleic acid was of the same order as that of window glass and that "glass certainly would not be considered soluble for the purposes of flotation" (P. B., pp. 70-76).

To establish the partial solubility of oleic acid and that the alleged soluble part formed the froth, was so vital to Respondent's contention of anticipation of the patent in suit by the disclosure of patent No. 835,120 that it seems inexplicable that its experts did not demonstrate in Court that a solution of oleic acid would produce a mineral-bearing froth. They had ample opportunity to do so. But no such demonstration was made in Court, nor is there any evidence in the case that their experts made any such demonstration at any time. Plaintiff proved the contrary (see P. B., pp. 53, 54).

Curiously enough Respondent's Brief three times asserts or implies (pp. 36, 40, 43) that the burden of proof is upon the plaintiff to establish the fact that the patent in suit, No. 962,678 is not anticipated by patent No. 835,120. The burden of proof is quite the other way. It rests on respondent. The respondent alleged in its answer that patent No. 835,120 anticipated the patent in suit and the burden of proving that defense in all its branches was upon the respondent. On both the propositions incidental to this defense that are advanced by respondent, namely, that the soluble substances of 962,678 coat the mineral particles just as oleic acid, the typical agent of 835,120 does, and that a part of oleic acid is soluble in the pulp, just as the reagents of 962,678 are, the burden is on respondent.

As to the asserted inclusion in the disclosure of patent No. 835,120 of other specific substances than oils and oily liquids, Respondent's Brief bases arguments on words and names as contra-distinguished from the substance of things.

Thus the term "fatty acid" in chemical classification is applied to all the members of a certain series of compounds which, in their chemical constitution, are similar, but which differ

[1]R., Vol. I, p. 651. See also P. B., p. 70, where the pertinent part of the opinion is quoted and commented upon.

widely in their physical characteristics, only some of them being of a fatty or oily nature like oleic acid, such as would adapt them to display selective affinity or attraction for, and to mechanically unite under water with, and so coat, metalliferous matter.

Respondent, however, by following this chemical classification without regard to the physical characteristics, and also by following commercial nomenclature regardless of either chemical composition or physical characteristics, misled the Court below into believing that specific mineral-frothing agents that are wholly dissolved in the water of the pulp and so could not have, and usefully exercise, the preferential affinity for metalliferous matter of patent 835,120, are nevertheless oils of that patent.

One of the substances which acts as mineral-frothing agent in solution and is specifically named in the patent in suit, valerianic acid, is classified by Respondent as an oil of patent No. 835,120 because it is chemically a fatty acid, although it is not physically an oil or an oily liquid and it does not have the physical characteristics of oils and is admittedly completely soluble in water in the proportions used in flotation. Professor Taggart includes this substance with acetic acid as a fatty acid of the prior art, although even he admits that valerianic acid and acetic acid would not normally be referred to as oils (R., Vol. I, pp. 205, 206, Q26). Acetic acid is familiar as ordinary table vinegar. Although it is classified chemically as a fatty acid, it is needless to say that in its physical characteristics it is not an oil or oily liquid. It acts as a mineral-frothing agent in solution. It is completely soluble in the water of the pulp and does not have selective affinity or attraction for, nor can it mechanically unite under water with, the metalliferous matter as a coating, for it goes wholly into the water of the pulp. Vinegar is physically the antithesis of oil in every respect.

Another substance acting as a mineral-frothing agent in solution is ordinary table salt, sodium chloride. Obviously when

completely dissolved in water it cannot have preferential affinity for, or preferentially coat, the metalliferous mineral particles. Yet, according to the definition of Respondent's Brief, appearing at page 29 therein, ordinary table salt

> "forms a mineral-bearing froth, thereby displaying its preferential affinity for metalliferous matter over gangue."

What could be more destructive of this Court's definition of the oils of the patent No. 835,120 than such an interpretation of that definition? It does not require any particular skill in the metallurgical art to know that salt water and dilute vinegar are not oils or oily substances and do not have the physical characteristics of oils or oily substances and do not have the preferential affinity for metalliferous matter that oils or oily substances have.

An example of misleading commercial nomenclature which Respondent's Brief attempts to turn to its advantage is the name commercially given to amyl acetate. Amyl acetate is a mineral-frothing agent in solution of the patent in suit No. 962,678. It is commercially known as banana oil. It is a colorless liquid not oily at all and gives a clear and brilliant solution. Yet it is claimed to be an oil of patent No. 835,120 because commercially called an oil, as well as because in the process of 962,678 it will produce a mineral-bearing froth.

By parity of reasoning, as we said in Petitioner's Brief (p. 110), sulphuric acid, commercially known as oil of vitriol, would be an oil of patent No. 835,120, although it is disclosed in that patent as a gangue-corrective used with the oily substance, oleic acid, and not as a mineral-frothing agent.

The above are merely examples of the many misleading statements of Respondent's Brief. Similar statements made in the briefs and argument to the Court immediately below unquestionably misled that Court. Petitioner's Brief sufficiently discusses the errors made by the Court immediately below in this connection (P. B., pp. 76-80, 109-114).

Respondent's new and false definition of "preferential affinity for metalliferous matter" as "producing a mineral-bearing froth" is really a grotesque anachronism. It ignores the well known specific quality of oil, when agitated in an ore pulp, of having a preferential affinity for metalliferous matter, a quality well known in many processes, as this Court has said, ever since the days of Haynes, Everson and others, and instead defines that quality by a result peculiar to a particular process and first made known to the world, as this Court has also said, by patent No. 835,120.

What did the phrase "preferential affinity for metalliferous matter" mean, we might ask Respondent, before there was any mineral-bearing froth?

What did it mean in Haynes, in Everson? What did it mean in the Elmore bulk-oil process? What did it mean in the Cattermole granulation metal-sinking process? What did it mean to the stickiness of coating required for the granulation step in the last-named process? *

---

* *The Cattermole granulation process* proceeded by coating the metalliferous particles in the pulp (particles many of them as fine as dust) with oil until the coated particles acquired the *quality of stickiness* with reference to each other and *stuck together* when they collided in the agitated pulp (in a way like a snow ball rolled in sticky snow) and eventually thereby formed larger agglomerates or granules such as would sink in an up-current of the pulp sufficiently rapid to carry upward the uncoated and ungranulated and so still exceedingly small and fine particles of gangue; and thus the granules were separated from the gangue in a metal-sinking operation. It required from 36 to 72 lbs. of oil to the ton of ore to achieve the required *quality of stickiness* in this oil coating on the mineral particles. Nothing could be clearer than that this granulation process involved and required the mechanical uniting of the oil with the mineral particles in preference to the gangue in the form of a coating thick enough to acquire the desired quality of stickiness. In this process it would be absurd to say that the preferential affinity of the oil for the metalliferous matter meant its capacity to bring up a mineral-bearing froth. Clearly Respondent's definition does not apply. On the contrary our definition exactly applies.

Now this is crucial because it was out of precisely that granulation process that the process of 835,120 was born by an exploration of how much that 36 lbs. of oil could be reduced—how thin that coating could be made. And as the exploration proceeded and the amount of oil was reduced, without any other change, the phenomenon of granulation gradually disappeared and a then altogether new phenomenon took its place, the phenomenon of a mineral-bearing froth, which phenomenon was accounted for then by its discoverers and inventors and by their patent No. 835,120 and has been accounted for ever since by everybody (outside of this litigation) as due to the thinness of the oil coating on the metalliferous matter and the tendency of that so thinly-coated matter to rise to the surface in the form of froth, when caught by the air-bubbles in the pulp and brought up by the lifting force of those air bubbles.

Respondent by its new and false definition of "preferential affinity" in effect credits patent No. 835,120 with being a patent broadly for a result, a mineral-bearing froth however obtained, although this Court explicitly held that that patent was not for a result (250 U. S. 349). There (the *Butte* case) this Court said of 835,120:

> "The patentees discovered the described process for producing the result or effect, the metal-bearing froth, but they did not invent that result or froth,—their patent is on the process; it is not and cannot be on the result; and the scope of their right is limited to the means they have devised and described as constituting the process."

The repeated misuse of the phrase "preferential affinity for metalliferous matter" in Respondent's Brief is so vital a matter that it has received first attention.

The three criticisms found on pages 3 to 7 of Respondent's Brief under the heading "Plaintiff's Statement of the Case is Erroneous," spring wholly from Respondent's misuse of the phrase "preferential affinity for metalliferous matter over gangue" and fall when that error is corrected.

In fact, the correction of that error sweeps away the whole fabric of Respondent's argument as to the First Defense covering pages 7 to 58 of its Brief.

Another fundamental error of Respondent's argument is the failure to recognize that the invention claimed in the patent in suit is a process. It is conceded that this Court in the *Hyde* case and the *Butte* case "made clear that the discovery of patent No. 835,120 was a *process* discovery" (R. B., p. 18), but the process of the patent here in suit, a much more astonishing process discovery—a complete departure from the prior art—is treated in Respondent's Brief as not a process invention at all. Indeed in the discussion of the invention in issue and of the prior art, *process is disregarded and agents used are alone considered.* For example, Point I (R. B., p. 10), is as follows:

> "The subject-matter claimed in patent 962,678 is the use of a 'soluble' mineral-frothing agent in the agitation froth process of plaintiff's earlier patent 835,120. There is no other difference between them."

This ignores the fact that the subject-matter claimed is a new process and ignores the fact proved in the evidence that this process differs essentially from the process of patent No. 835,120. The two processes are compared in Petitioner's Brief (pp. 39-46). Nothing appears in Respondent's Brief making it necessary to alter that comparison. Respondent's argument on this point (R. B., pp. 10, 11) merely quotes the first of these differences and assumes that the other differences, although established by the evidence, do not exist.

Moreover, substances are listed in an appendix to Respondent's Brief (pp. 91-95) indiscriminately and without regard to process or function or result.

The errors of Respondent's Brief of perhaps next importance are the charge that the present assertions of Petitioner's counsel as to the utility of the invention here in suit are (R. B., p. 52)

> "contradictory of the plain facts and of what the same counsel urged upon this Court and the other courts in the litigation on Patent 835,120"

followed by the assertion that

> "In this way counsel seek to escape the troublesome fact, proved in this record, that the soluble mineral-frothing agents named in Patent 962,678 have never had any commercial use."

We will first consider the charge and then the assertion.

The charge is entirely without foundation.

In the suit of *Minerals Separation* v. *Hyde* (commenced in 1911) the sole issue as to infringement was the use by defendant on a zinc ore of a froth-flotation process employing oleic acid as the frothing agent. In that suit the Australian oper-

ations with zinc ores were fully set forth and the financial returns of those operations were proved. Operations in Sweden, Chili and Cuba with the process of patent 835,120 were also proved and the sum total of all these operations was large, so much so that Judge Bourquin said of the process (*Minerals Separation* v. *Hyde*, 207 Fed. 959):

> "Its successful operations, practically from discovery, have recovered, and largely from waste and tailings, values aggregating near $9,000,000, and at a profit of near $4,000,000 to the patent owner and its licensees."

In the suit of *Minerals Separation* v. *Butte & Superior Mining Co.*, the infringement was at the same mine and with the same ore. It developed at the trial (April and May, 1917), however, that operations with oleic acid had been followed by operations with other substances, including one—called pine oil—which had constituents that acted as mineral-frothing agents in solution as well as constituents which acted as insoluble mineral-frothing agents. Accordingly a motion was made to include in the suit the patent here in suit, No. 962,678, but Judge Bourquin denied the motion and so the suit proceeded on patent No. 835,120 alone. Patent No. 962,678 was, however, put in evidence and the fact that its process was to some extent used by the defendant there when it used pine oil was repeatedly referred to in briefs and arguments in behalf of the plaintiff. There was, however, no evidence in that suit as to what proportion or quantum of its constituents went into solution and what proportion or quantum of its constituents was insoluble.*

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* The typical example referred to by this Court in the *Butte & Superior* suit (250 U. S. 342) of the later operations of the defendant there, was one wherein a mixture of kerosene, fuel oil and pine oil was used, and wherein the total amount of oil was 1½% (30 pounds to the ton of ore), and the two first mentioned constituents (insoluble petroleum products) were present in excess of 1%. These later operations were held by this Court not to be an infringement of patent No. 835,120. This Court in that case discussed only the question as to whether or not the insoluble petroleum products used were oils of patent No. 835,120.

In the present suit there is definite evidence as to the proportions of soluble and insoluble constituents in different pine oils. Professor Taggart states his determination of different specimens as giving solubilities of 78.8%, 69.2% and 40.4% (R., Vol. I, pp. 219, 220, Q58) and also testifies that pine oil is a variable "mixture of a lot of different chemical compounds."

In the suit of *Minerals Separation* v. *Miami Copper Company* (April and May, 1915), both the patents here in suit were involved, and the important fact that the use of the process of the patent in suit was essential to the froth-flotation concentration of porphyry copper ores was quite fully brought out. The issue as to infringement was the conjoint use of the processes of patents Nos. 835,120 and 962,678, and also a third patent not here involved. The defendant's ore there was a porphyry copper ore.

As we have carefully pointed out it was not until after the invention and patenting of the process here in suit and the beginning of the use of that process, either alone or conjointly with the process of No. 835,120, that porphyry ores were found to be amenable to froth-flotation concentration. We said in Petitioner's Brief at page 52:

> "For the flotation of porphyry ores the process of patent No. 835,120 is, in the majority of cases, greatly advantageous, but the process of the patent in suit No. 962,678, is in all cases absolutely necessary."

The whole story of commercial operations of the two processes is set forth in the record here and is briefly and accurately summed up in Petitioner's Brief, pages 46-52.

As to the above quoted assertion of Respondent's Brief that the soluble mineral-frothing agents named in the patent in suit have never had any commercial use, the fact is quite the contrary. Phenol and its homologues, including cresol, have been extensively used, largely in the form of complex substances containing them. They appear among the agents used by 54 of the 80 licensees of the plaintiff whose reagents are proved (R., Vol. II, pp. 695-712) representing a total tonnage of more than 90,000,000 tons of ore treated (pp. 721-723). Three of these licensees used cresol. The others used creosotes and tars selected and manufactured to contain substantial quantities of phenol and its homologues. It may be noted here that there is no evidence of the disclosure or use of phenol or its homologues or any substances containing them in a froth-flotation

process prior to the phenol tests of Stevens on December 8, 1908, in the work of reducing to practice the present invention.*

In the Brief for Respondent in Opposition to Petition for Writ of Certiorari (on file in this Court), on page 5, appears the following foot-note:

> "In 1923, when the instant case was on trial, the yearly aggregate of licensed tonnage was 169,041,149 tons (Pltf.'s Exs. 18 and 19; R., II, 83-93)." [Present record, R., Vol. II, pp. 713-723.]

This statement is erroneous. The figure is neither the yearly annual tonnage nor the total tonnage. It is the total licensed tonnage of ore treated in the United States up to June, 1923, insofar as the returns of licensees are in figures of tons of ore treated. To this is to be added 1,084,313 tons of concentrates produced where the returns were in that form, and to it is to be further added 38,085,664 pounds of lead, zinc and copper recovered and 7,678,437 ounces of gold and silver recovered, where the returns are in weight of metals recovered (R., Vol. II, p. 725). Moreover the record does not show the extensive use of the process in the rest of the world, nor the fabulous profits of the mine owners, nor the amounts paid as royalties.

In that Brief (p. 5) attention is also called to the fact that the Petitioner has enjoyed the benefit of the favorable decision of the Circuit Court of Appeals for the Third Circuit, from its date May 24, 1917, to the expiration of the patent in suit on

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* See *infra* pp. 21, 22. As to the prior processes on which Respondent relies as disclosing coal tar and wood tar products, etc. (R. B., pp. 52-53 pp. 13-17; Appendix, pp. 91-95) the testimony of Mr. Higgins showing how totally different these processes are from that in suit, is here cited with references to Vol. I of the Record.

Haynes, pp. 424-425, Qs. 1-5;
Bessel, pp. 425-427, Qs. 6-24;
Everson, pp. 427-430, Qs. 25-45;
Sutton, p. 431, Qs. 46-48;
Robson and Crowder, p. 431, Qs. 49, 50;
Froment, pp. 431-435, Qs. 51-85;
Elmore 703.905, p. 435, Qs. 86-89;
Cattermole, pp. 437, 438, Qs. 105-109;
Cattermole, Sulman & Picard, pp. 438-442, Qs. 110-152;
Sulman & Picard, pp. 442-443, Qs. 153-161.

June 28, 1927, and that the great bulk of the ore treated in this country was under license, and it is said (*ib.*):

> "The validity of the patent is, therefore, a question that interests only the petitioner, the respondent and the National Lead Company"

thus conceding acquiescence in the patent in suit and payment of royalty up to the date of expiration of the patent by almost all of the tremendous mining industry.

A parallel statement of the facts as to use at the two periods in question (i. e. at the time of the *Hyde* testimony, 1912, aggregate recoveries of $9,000,000 and at the time of the trial in the instant case, 1923, aggregate licensed tonnage greatly exceeding 169,000,000 tons of ore) demonstrates that while the results achieved during the first period were remarkable and revolutionary, yet when compared with the stupendous figures of the later period, they sink into relative unimportance. The invention of the patent in suit has been, in its practical benefits to society in creating wealth and conserving the mineral resources of the earth, the greatest invention ever made in the metallurgical art.

Petitioner's Briefs and arguments in the prior litigations as well as in the instant case have been with meticulous care based upon the facts proved in each case as to the utility of the invention before the Court and nothing now urged in that regard by petitioner's counsel is contradictory of what was urged in those litigations.

Respondent's Brief, at pages 55 and 56, charges a misquotation by us to support the assertion that the references in patent No. 835,120 to patent No. 777,274 are specifically "confined to the disclosure of oleic acid therein." There is absolutely no basis for this charge. There is no misquotation.

Respondent's Brief on pages 22 and 23 made fragmentary quotations from the testimony of Mr. Higgins which might to the casual reader not referring to the record, convey a wrong

impression. It is only necessary to say in that connection that in the omitted parts of his testimony he made it quite clear that the man skilled in the art attempting to practice the process of patent No. 835,120 would not select substances that dissolve in the pulp. For example, at R., Vol. I, p. 502, Mr. Higgins' complete answer to XQ526, of which the word "Yes" only is quoted, is as follows:

> "A. Yes, but as I said before, if he dissolves the substance then he does not coat the metalliferous mineral particles, and he does not, in my opinion, practice the process of the patent No. 835,120."

Respondent's Brief makes frequent appeals from the theorist to the practical expert in the art. But the appeal is fatal to its every contention and especially to its contention that the process of 962,678 was disclosed in 835,120. That those who were expert in this art in 1908 did not then find in patent No. 835,120 the description of the invention of the patent here in suit No. 962,678 that Respondent's Brief now finds in it, appears from the evidence as to the circumstances under which the invention of patent No. 962,678 was made and as to the necessity that mothered it. See Stipulation as to Elmore litigation (R., Vol. I, pp. 600, 601) and Stevens (R., Vol. I, p. 375) and his reports (R., Deft.'s Ex. 115, Vol. II, pp. 1106-1184) and the efforts there recited to obtain mineral-froth flotation "without the use of oil," [1] "without the addition of oil," [2] "obviating the addition of oil," [3] "in the place of oil," [4] and to provide "substitutes for oil" [5] in order to avoid the Elmore patent. See *infra*, pages 21, 22.

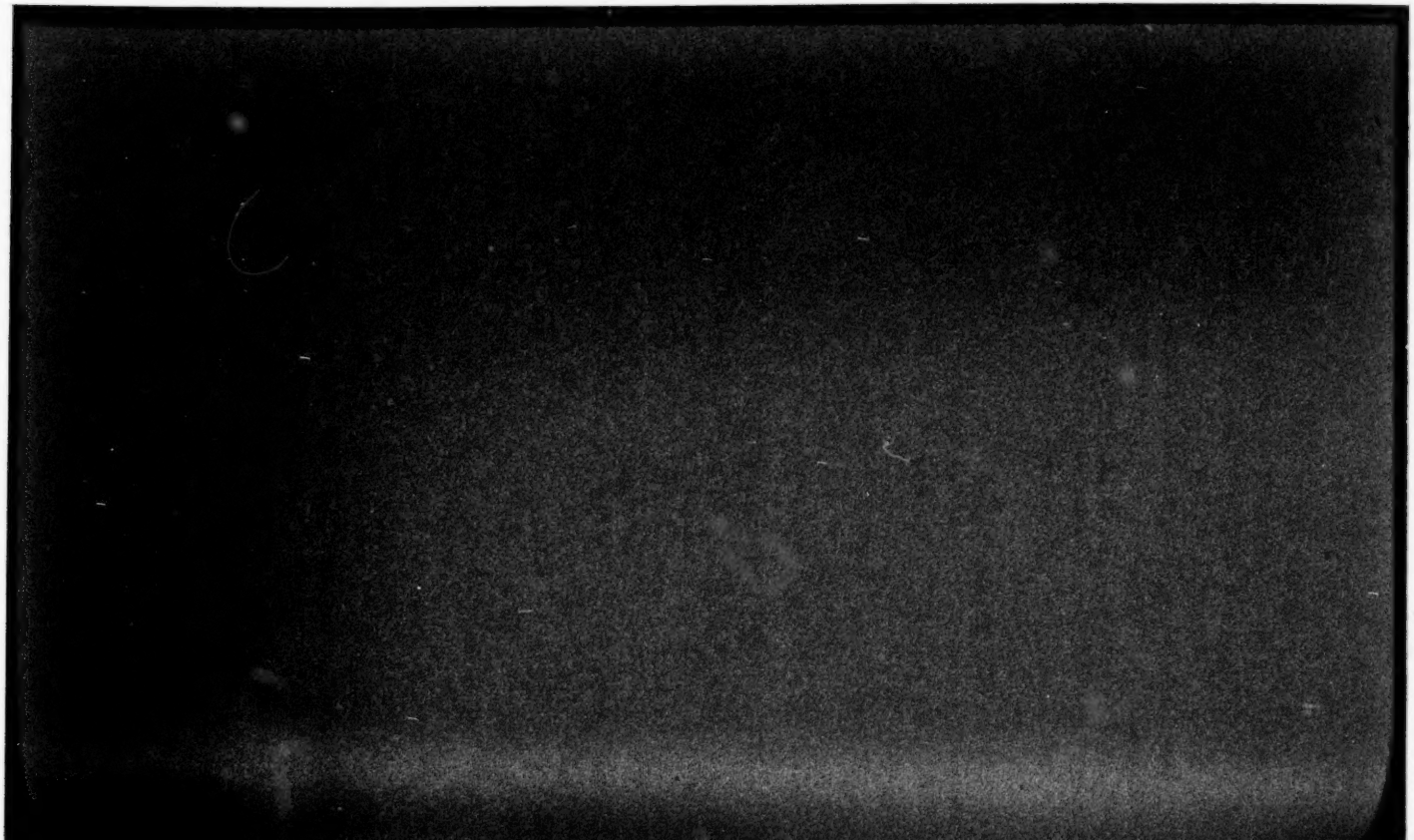
In conclusion as to the first defense, it is to be noted that the errors of the Court immediately below, pointed out in Petitioner's Brief, are not explained or excused or defended in Re-

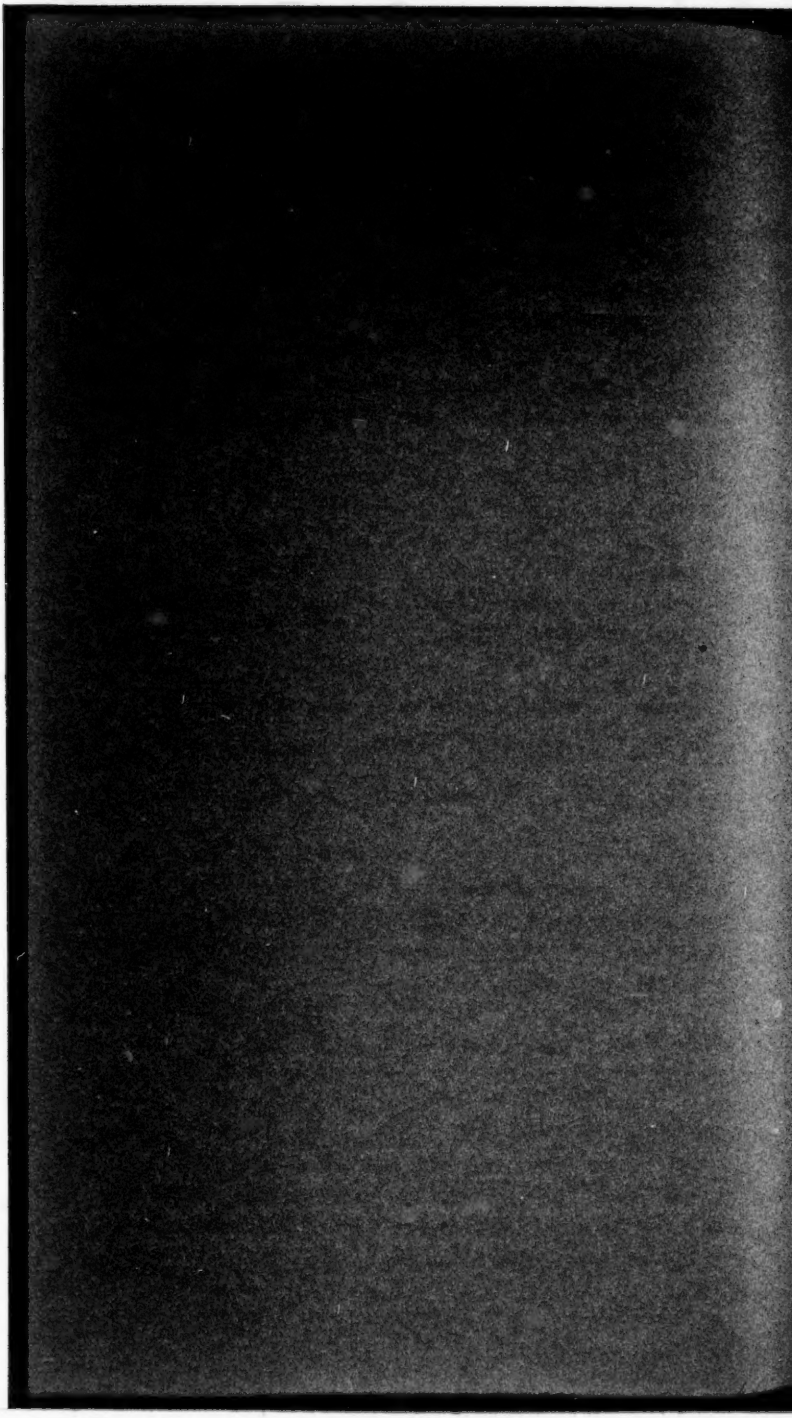
1. R., Vol. II, p. 1106.
2. R., Vol. II, p. 1128.
3. R., Vol. II, pp. 1135, 1136, 1140, 1142, 1149, 1151, 1152, 1159, 1166.
4. R., Vol. II, pp. 1110, 1116, 1120, 1121, 1145, 1165.
5. R., Vol. II, p. 1127.

spondent's Brief, which merely attempts to support the conclusions of that opinion by again presenting the arguments which were presented below and which prevailed only because of misunderstanding and confusion as to the facts of the case. Other matters debated in Respondent's Brief in connection with the first defense appear to have been sufficiently anticipated and considered in Petitioner's Brief.

Respondent's Brief presents arguments as to five other defenses in addition to the first defense above considered and which was the only defense discussed in the opinion immediately below. All of these defenses were argued in both courts below and the trial Court discussed all of them in its opinion except the 2nd and 3rd and found against defendant.

This is a suit in equity, and we take it that an affirmance of the decree of the District Court will require some consideration of all of the defenses here presented and we will, therefore, now consider the defenses numbered from 2nd to 6th.





THE SECOND AND THIRD DEFENSES.

These defenses are parts or aspects of one defense and that defense really is that the owners of the invention in issue, predecessors of Petitioner-plaintiff, in patenting it in England took steps that defeat the patent in this country.

The matter was fully argued in both courts below but the trial Court found against defendant without deeming it worthy of discussion and the Court immediately below held the patent in suit void without adverting to this defense.

The matter is purely technical but since the respondent-defendant deduces from the efforts made to secure patent protection in England, a defense which would be of substance if maintained, namely, that the invention was not the joint invention of the three patentees, Sulman, Greenway and Higgins, we will consider that defense first.

The Third Defense i.e., that the patentees were not Joint Inventors (R. B. pp. 63-68).

The reasoning of Respondent's Brief is as follows:

1. The earliest date available to plaintiff as the date of alleged joint invention is February 1, 1909, the date of filing of Provisional Specification by Sulman, Greenway and Higgins of British patent 2359 of 1909, describing the generic process of the patent in suit No. 962,678.

2. Prior to that date Sulman and Higgins each had knowledge of a specific process within the four corners of that generic process, as evidenced, in the case of Sulman, by the Provisional Specification filed December 24, 1908, of British patent No. 28,173 of 1908 (disclosing an alcohol process—Deft.'s Ex. 68, R., Vol. II, pp. 1054-1057); and, in the case of Higgins, by the Provisional Specification filed December 10, 1908 of British patent No. 26,852 of 1908 (disclosing a phenol process—Deft.'s Ex. 68, R., Vol. II, pp. 1050-1052).

3. Therefore Sulman having knowledge of one part and Higgins of another part prior to February 1, 1909, Sulman, Greenway and Higgins could not, on February 1, 1909, have been joint inventors of the whole.

The reply to this is that on the proofs the date available to plaintiff as the date of joint invention is *December 8, 1908*, and that the Provisional Specifications referred to (of December 10, 1908, and December 24, 1908) are too late to anticipate and moreover they evidence contributions of Higgins and of Sulman, respectively, toward the whole, and merely constitute steps, entirely proper under the English law, toward patenting the whole. Higgins' contribution of the phenol species and Sulman's contribution of the alcohol species were properly separable as species inventions and patentable under the English law (as we shall point out) as such, while at the same time constituting parts of, and contributions toward, the whole, the generic invention, the invention of the February 1, 1909, Provisional Specification.

Thus, the two British provisional specifications of December 10, 1908, and December 24, 1908, do not evidence or tend to evidence the absence of joint inventorship but precisely the reverse.

These matters we shall take up in turn.

The Date of Invention.

The law is that a patentee in this country who made his invention abroad is entitled to carry back his date of invention to the earliest work he did abroad, where originality of invention is in issue or it is necessary to validate his patent as against alleged anticipation.*

We understand this is admitted (R. B., p. 66).

The bill of particulars (R., Vol. I, p. 91) alleged May, 1908, as the date of conception and disclosure of the invention and December 8, 1908, as the date of reduction to practice.

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* *Hanifen* v. *Godshalk*, 78 F. 811; *Hanifen* v. *Price*, 96 F. 435; *Welsbach* v. *American Co.*, 98 F. 613.

It was stipulated (R., Vol. I, pp. 600, 601) that in the Spring and early Summer of 1908 and up to August, 1908, Sulman, Greenway and Higgins were all in London (all being in a common service for Minerals Separation, Ltd., predecessor of petitioner); and that in August, 1908, Higgins went to Australia and returned in March, 1909; that on February 20, 1907, litigation had been commenced against Minerals Separation, Ltd. for infringement of certain Elmore patents for the use of an acidified pulp with oil in an ore concentration process; that on or before October 21, 1908, Mr. Justice Neville's decision [1] (favorable to Minerals Separation, Ltd.) was made; that on December 2, 1908, Mr. Justice Fletcher Moulton rendered the decision of the Appellate Court [2] (reversing the lower court on the issue of infringement). The serious and alarming situation for Minerals Separation, Ltd. that was created by this reversal was happily relieved a year later (November 16, 1909) by the House of Lords, [3] who reversed Mr. Justice Fletcher Moulton (R., Vol. I, p. 600), but meantime the necessities of its commercial situation drove it and its experts and inventors forward in their work on a froth flotation process that would do away altogether with the use of oil.

Plaintiff's *prima facie* proofs did not call for proof of date of invention.

Defendant's proofs furnished, in the stipulations and in the testimony of Stevens and in the records and documents introduced through, or in connection with, his testimony, all the evidence required both of date of invention and of the fact of joint inventorship.

This evidence (R., Vol. I, p. 375, 376 and Vol. II, pp. 1107-1184) shows that, within a week of Mr. Justice Fletcher Moulton's unfavorable decision holding that the process of 835,120 as used in an acidified pulp infringed the Elmore patents, and on December 8th and 9th, 1908, Stevens was at work in London under the immediate direction of his superiors, including Sulman and Greenway, and in part on suggestions which Higgins

1. *British Ore Concentration Syndicate, Ltd.* v. *Minerals Separation, Ltd.* (High Court of Justice, Mr. Justice Neville) 25 R. P. C. 741.
2. *Same* v. *Same* (Court of Appeal) 26 R. P. C. 124.
3. *Same* v. *Same* (House of Lords) 27 R. P. C. 33.

had communicated to Minerals Separation, Ltd., reducing the generic invention to practice and testing it out in some of its many possible forms of embodiment. This work continued intensively through December, 1908, and January, 1909, and some of it continued later. Stevens' reports (Deft.'s Ex. 115, R., Vol. II, pp. 1106-1184) show tests on December 8, 1908 (R., Vol. II, p. 1107) and December 9, 1908 (pp. 1108 and 1109) with carbolic acid (phenol) as the mineral-frothing agent, reported to Minerals Separation, Ltd. twice on December 11, 1908 (pp. 1106 and 1110), one of the reports beginning (p. 1106) "I beg to report results of tests made on Broken Hill ore without the use of oil," and one of the enclosures being headed (p. 1111) "Results of Tests on Frothing without oil." Tests continued on December 13th, (p. 1117), December 16th (p. 1118) and December 18 (p. 1119) reported on December 23rd (p. 1116). On December 30, 1908 (p. 1120), report was made of "Bottle tests for Mr. Greenway, using various reagents in the place of Oil" (p. 1121). Among the last group of reagents were included amyl alcohol (p. 1122). This work continued intensively through January, 1909 (pp. 1123-1150) and included (p. 1132) "Result of Experiments carried out with amyl alcohol and amyl acetate." This testing and experimental and development work shows unusual diligence in adapting and perfecting the invention. As it progressed Minerals Separation, Ltd., the owner, caused Provisional Specifications to be filed in the British Patent Office (as it had the right to do under the peculiar English law in that regard) which might subsequently within a time limited by the law be treated as applications for patents if Minerals Separation, Ltd. so elected, one on Dec. 10, 1908 (No. 26,852 of 1908), in its own name as a communication from Mr. Higgins, then in Australia, for a process using the "aromatic hydroxy compound" group of agents "such as phenol, cresol, etc." (Deft.'s Ex. 68, R., Vol. II, p. 1051), another on December 24th, 1908 (No. 28,173 of 1908) in the names of Sulman, Picard and Ballot, for a process using the "alcohols" group of agents "such as amyl-alcohol" (Deft.'s Ex. 70, R., Vol. II, p. 1054), and a third on Feb. 1st, 1909 (No. 2,359 of 1909) in the names of Greenway, Sulman and Higgins for the process using

any one of the entire class of "organic substances" "in solution" "which enable metallic sulphides to float" "in the form of a froth" (Deft.'s Ex. 75, R., Vol. II, p. 1080), the last provisional specification including the subject matter of the other two insofar as they were limited to froth-flotation and much more besides. These Provisional Specifications were all signed by "Boult, Wade and Tennant," well known "Chartered Patent Agents" of London. They must be presumed to have known the English law and to have acted strictly in accordance with it. We shall return to that phase of the matter later.

The next event of importance was the preparation of the application for the patent in suit. It followed the Provisional Specification of Feb. 1, 1909, in covering the process using any one of the entire class of mineral-frothing agents in solution and in including in that class the "aromatic hydroxy compound" group of the December 10, 1908, Provisional Specification, and the "alcohols" group of the December 24, 1908, Provisional Specification, and in ascribing that generic invention to Sulman, Greenway and Higgins.

And on April 20, 1909, in London (Higgins having now returned from Australia), all three men took, and subscribed to, the oath of joint inventorship that is found at page 740 of Vol. II of the Record.

This oath

> "that they verily believe themselves to be the original, first, and joint inventors of the 'Improvements in Ore Concentration' described and claimed in the annexed Specification"

and

> "that no application for patent on said improvements has been filed by them or their representatives or assigns in any country foreign to the United States, except as follows: Great Britain under No. 2359 dated 1st February, 1909 and Australia No. 13947 dated 8th March, 1909"

must be assumed to have been taken in knowledge of all the facts and on advice of counsel as to the legal effect of those facts and honestly and without any mental reservations.

No one of the three men has ever raised any question whatever as to the fact of joint inventorship or any doubt as to

the truth of the oath. Respondent's allegation that the oath is untrue has not a scintilla of evidence in the case to support it.

We return later to discuss the legal effect of the oath and the great burden that it put upon Respondent to disprove the truth of the fact sworn to in it by all three men.

We note that the two claims here in issue were claims 1 and 2 of the application as so sworn to (R., Vol. II, p. 737).

On *April 30, 1909,* the application was filed and in due course issued as a patent No. 962,678 on June 28, 1910 (R., Vol. II, p. 753).

In England Minerals Separation, Ltd. on *June 24, 1909,* elected to file complete specification for No. 28,173 of 1908 (Prov. Spec. filed Dec. 24, 1908) which was accepted March 24, 1910 (D. Ex. 68, R., Vol. II, 1054); and on *June 28, 1909,* complete specification of No. 26,852 of 1908 (Prov. Spec. filed Dec. 10, 1908) which was accepted Feb. 10, 1910 (D. Ex. 68, R., Vol. II, p. 1051) and also of No. 2,359 of 1909 (Prov. Spec. filed Feb. 1, 1909) which was accepted March 1, 1910 (D. Ex. 75, R., Vol. II, p. 1080). This latter was later amended, as permitted under the English law, by disclaiming "the inventions claimed in the prior patents No. 26,852 of 1908 and No. 28,173 of 1908" (R., Vol. II, p. 1089, lines 46, 47).

Later, for the purpose of patenting in the United States the "alcohols" group of No. 28,173 of 1908 (Prov. Spec. filed Dec. 24, 1908), as a species of the broad invention, application for patent corresponding to that British patent was sworn to by Sulman as his sole invention on Nov. 9, 1909 (R., Vol. II, p. 1070) and filed on Nov. 22, 1909 (p. 1064) and issued on April 12, 1909, as patent No. 955,012 (D. Ex. 71, R., Vol. II, p. 1058-1062. File Wrapper and Contents pp. 1063-1078).

There was no inconsistency between Sulman's oath of joint inventorship of April 20, 1909, to the application for the patent in suit, and this oath of sole inventorship of Nov. 9, 1909, to the application for 955,012, because those two applications and patents do not claim the same invention; they are not interfering patents; they were co-pending applications and the Patent Office discovered no interference between the claims and no inconsistency between the oaths. On the contrary the in-

ventions are related as genus and species and there is no inconsistency between joint inventorship of a generic invention with others and sole inventorship of a species invention that lies within the four corners of the generic invention.

In all this history, which we have now completed, there is nothing to raise the slightest doubt as to the truth of the oath of joint inventorship made by all the actors in the transaction; and nothing estopping them or petitioner from standing on that oath.

THE BRITISH PATENT LAW.

Nothing in the British Patent Law or in the steps that Minerals Separation, Ltd., the owner, took to secure patent protection in England for the broad invention here in suit, destroyed its right to patent that invention in this country or affected or affects the question of joint inventorship or the question of validity of the patent in suit.

Langner, called by defendant, who was expert in the British Patent Law, testified with regard to that law and to its bearing on this case.

The application for British patent No. 26,852 of 1908 was filed by Minerals Separation, Limited, of London, on December 10, 1908, as a communication from Arthur Howard Higgins, of Broken Hill, New South Wales, Australia (R., Vol. II, p. 1051), then the temporary residence of Mr. Higgins. This method of patenting is a peculiar feature of British law. An invention communicated from abroad by any one who has knowledge of it may be patented by any person in England who has received the communication. The latter, although only the importer, may obtain a valid patent (Langner, R., Vol. I, p. 410, Q8).

The provisional specification of this British patent was filed December 10, 1908, and discloses a froth-flotation process employing as a mineral-frothing agent in solution an (R., Vol. II, p. 1051, lines 7-9):

> "aromatic hydroxy-compound such as phenol, cresol, salicylic acid or salicylates, hydroquinone, picric acid, pyrogallic acid."

The patent in suit No. 962,678 broadly covers processes employing these substances, specifying "phenol and its homologues" and in addition specifying (R., Vol. II, p. 664, lines 33-36):

> "amyl acetate and other esters; * * * benzoic, valerianic and lactic acids; acetones and other ketones such as camphor."

Claims 1 and 2 of the patent in suit are for the froth-flotation process of ore concentration achieved by the use of any one of the entire class of soluble mineral-frothing agents, whereas the British provisional specification No. 26,852 of 1908 discloses only a froth-flotation process of concentrating ores achieved by the use of one group of soluble mineral-frothing agents. Insofar as these two things overlap, that is to say, insofar as they have anything in common as to the mineral-frothing agent employed, the patent in suit is broad and generic and the British provisional specification No. 26,852 of 1908 is narrow and specific.

Just as any specific improvement on a broad invention is within the scope of the broad invention so is the specific improvement of the British provisional specification No. 26,852 within the scope of the invention pointed out by claims 1 and 2 of the patent in suit.

Mr. Higgins nowhere claims to have been the sole inventor of the broad invention of claims 1 and 2 of the patent in suit, nor does he anywhere make the additional disclosure found in the patent in suit and not found in British Provisional Specification No. 26,852 of 1908,—"amyl acetate and other esters, * * * benzoic, valerianic and lactic acids; acetones and other ketones, such as camphor."

The British Provisional Specification No. 26,852 of 1908, thus contained a limited and specific disclosure and, of course, no claims. It was under the British law a mere placing on secret record of a description upon which, at a later time, a complete specification and claims could be based, should the owner later elect to file a complete specification.

And later on, Minerals Separation, Limited, elected to follow up its rights under the British law in this connection, and filed,

on June 28, 1909, a Complete Specification, and that Complete Specification repeated the specific disclosure and *claimed only* the froth process of ore concentration in "slightly acidified water containing in solution a minute [small] quantity of *aromatic hydroxy-compound such as phenol.*"

Plaintiff's rights under the patent in suit had vested before that time, as we have seen, and could not be affected by the subsequent fate of the British Provisional Specification No. 26,852 of 1908.

In an entirely similar way and for precisely the same reasons, Minerals Separation, Ltd., on December 24, 1909, filed Provisional Specification No. 28,173 of 1909 (D. Ex. 68, R., Vol. II, pp. 1054, 1057) and in the name of Sulman, Picard and Ballot (as was permitted under British law, namely, joining owners with inventors) and for processes involving the use of "certain alcohols, such as amyl-alcohol," and including froth-flotation processes.

The "alcohols" group are mineral-frothing agents in solution of the patent in suit and so again the relation of this British Provisional Specification of December 24, 1908, in so far as it discloses the use of the alcohol group in a froth-flotation process, to the process of the patent in suit, is that of species to genus.

Here again, but, as before, after the rights of the patentees of the patent in suit had vested in this country, Minerals Separation, Ltd. elected to file a complete specification with claims and did so on June 24th, 1909, and some of the claims are for a froth-flotation process using certain of the alcohols as flotation agents.

The filing of the two *British Provisional Specifications on December 10th and 24th, 1908, respectively, merely gave to the owner of both a record date in England for the patenting of the particular species disclosed in those respective provisional specifications*, which dates would be good as against any subsequent applicant for a British Patent for the same species. It was the privilege of the owner of the rights so secured to crystallize the same by the filing at any time within nine months thereafter of a complete specification containing a fuller de-

scription and also containing claims exactly defining the invention sought to be patented, and when these rights were so crystallized and defined in the two cases we are considering, they pointed out different inventions in the eyes of the law from those pointed out and claimed in the patent in suit.

The whole body of evidence as to what was done in England prior to February 1st, 1909, including that of Stevens and his reports and the British Provisional Specification No. 26,852 of 1908 filed December 10, 1908, and the British Provisional Specification No. 28,173 of 1908 filed December 24, 1908, tends to show participation by Sulman, Greenway and Higgins in a joint enterprise which culminated in the filing of the *British Provisional Specification No. 2,359 of 1909,* on February 1st, 1909. The latter was filed by Greenway, Sulman and Higgins. It describes the froth-flotation process of the patent in suit and broadly describes processes employing organic mineral-frothing agents in solution, and says as to these mineral-frothing agents (R., Vol. II, p. 1086, lines 16-29):

> "Among the organic substances which in solution we have found suitable with certain ores are acetic acid, propionic acid, butyric acid, valerianic acid, lactic acid, methyl-, ethyl-, propyl-, butyl-, amyl alcohols, glycerine-ethereal salts such as ethyl acetate, amyl acetate; phenol, cresol and their homologues and many of their derivatives, such as resorcin, trinitrophenol, salicylic acid; acetone and other ketones or aldehydes such as formaldehyde and furfural, or mixtures of these. These are all more or less effective in the presence of an acid such as sulphuric, and are given as types; but are not intended to form an exhaustive list of suitable organic substances which may be used in this manner and for these objects.
>
> "On the other hand there are many organic compounds which in solution will not substantially effect the result described, such as some sugars, dextrine, albumen, etc., and a simple test is required in the case of varying ores or materials to determine which organic compound is most suitable."

This includes all of the agents specifically disclosed in the British Provisional Specification No. 26,852 of 1908 (ascribed

to Higgins) and in the British Provisional Specification No. 28,173 of 1908 (ascribed to Sulman), and much more besides.

Under British law, as above stated, all questions of priority as between rival inventors are determined by the date of the filing of the provisional specifications (Langner, R., Vol. I, pp. 415, 416, XQs 34, 35). Hence it is the practice to file provisional specifications as promptly as possible when the development of the invention warrants the filing (XQ36). Nine months are allowed thereafter for filing the complete specification (XQs37, 38). Therefore the only method of obtaining a provable date of invention in England is by the filing of a provisional specification and this undoubtedly prompted the filing of provisional specification No. 26,852 of 1908 on December 10th and the filing of British provisional specification No. 28,173 of 1908 on December 24th of that year, each describing a species of the invention, and the filing of the British provisional specification No. 2,359 of 1909 on February 1st of that year, when the tests warranted it, for the broad invention including all its species.

Under British law it was then (i. e., after Feb. 1st, 1909) open to Minerals Separation, Limited, the owner of all three, to take either of two courses, namely, first, it could abandon the first two provisional specifications and secure a single British patent for the aggregate subject matter of all three based on the provisional specification of February 1, 1909 (*but with priority limited to February 1, 1909*), or, secondly, it could take out a patent for the species of the December 10th, 1909, specification (thereby obtaining the benefit of the date December 10, 1908, as to priority for that species), another patent for the species of the December 24th, 1908, specification (likewise obtaining the benefit of the date December 24, 1908, as to priority for that species), and a third patent based on the February 1, 1909, specification (limited in England as to priority to February 1, 1909) for that precise residue of the broad invention that would be left over after subtraction by specific disclaimer of the subject matter of the other two species. A peculiar disclaimer of that kind, although unknown to the United States patent law, is permissible under the British patent law and

actually was made in this instance (Langner, R., Vol. I, pp. 406-409, Qs4-7; pp. 418, 419, XQs54-57).

The first course would have been the more natural course to pursue, for the monopoly of the first two species would in that event have lasted a month or two longer because the date of the patent for the whole would have been February 1, 1909. That course, however, would have involved the risk that someone else might have in the interim filed a British provisional specification for one or both of the same inventions. If so, such other person would have had the right to the patent to the exclusion of Minerals Separation, Limited. The latter had no means of knowing at that time nor for many months afterward whether or not such intermediate provisional specification had been filed by some hostile interest.

The advantage of taking the second course was that as to the two specific inventions the rights of Minerals Separation, Limited, stood on earlier dates. Election between these two courses had to be made under British law within nine months from December 10, 1908, and December 24, 1908, respectively, as to these two specific inventions. Such election was, in fact, made in June, 1909, and ultimately three British patents issued, the three together covering, under the peculiar British laws relating to such a situation, what a single patent based on the provisional specification No. 2,359 of 1909, filed on February 1, 1909 would have covered.

This election of Minerals Separations, Limited, as to its course with respect to British patent protection, came, however, after the United States rights had crystallized and vested by the filing of the United States application on April 30, 1909, for the broad invention, namely, for the entire aggregate subject matter of the three British provisional specifications. Any election subsequently made by Minerals Separation, Limited, as to its British patents and any course of conduct subsequently followed by it with respect to British patent protection, had no effect, and could have no effect under United States patent law to change or alter or abridge in any way the rights in America of the American patentees of the patent in suit.

The Oath of Joint Inventorship.

The oath of joint inventorship that lies at the basis of the grant of the patent in suit (R., Vol. II, p. 740) certainly evidences the fact, and the conclusion and belief of Sulman, Greenway and Higgins as to the fact, that the broad invention was a joint invention, and it certainly negatives any possible inferences to the contrary that might be drawn from the earlier filing of the two British Provisional Specifications in December, 1908, and it is indeed conclusive of the whole question of joint inventorship.

Analyzing the oath of joint inventorship taken by all three it was as to each one of them in the nature of an admission against interest in favor of the other two.* *Sulman by his oath admitted* that he was not the sole inventor of the broad invention and that Greenway and Higgins participated in it. *Greenway by his oath admitted* that he was not the sole inventor of the broad invention and that Sulman and Higgins participated in it. *Higgins by his oath admitted* that he was not the sole inventor of the broad invention and that Sulman and Greenway participated in it. If anyone of them had been called to the witness stand in this case and had sworn that the broad invention was his sole invention, little weight would have been given to it by the Court in view of his earlier admission under oath and against interest to the contrary.**

The law is not technical or meticulous as to the manner of cooperation of joint inventors, or as to the proportionate amount of contribution of each one toward the whole, provided only that in the end a patentable invention has been made and each one has in some way or other contributed something of substance to it.†

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* Testimony or oath to joint inventorship is an admission against interest and is to be given weight accordingly.

See
Lemp v. *Randall*, 146 O. G. 255; 33 App. D. C. 430;
Hoe v. *Kahler*, 12 F. 111.

** See
Schlicht v. *Chicago*, 36 F. 585;
Armat v. *American*, 118 F. 840.

† See
Walker on Patents, 5th Ed., §46, p. 61;
Vrooman v. *Penhollow*, 179 Fed. 926;

(Footnote continued on next page.)

In the case at bar the three inventors have severally taken oath that the invention in issue was a joint invention and no one has taken oath to the contrary, either in this case or in any other case or proceeding. And there is no circumstantial or collateral evidence of any kind negativing the proposition of joint inventorship or showing the falsity of the oath of joint inventorship or tending in the slightest degree in that direction. There is nothing whatever inconsistent in three persons being joint inventors of a broad and generic invention based upon a broad class characteristic and at the same time each one being the sole inventor of some particular species within the four corners of the broad genus.

The Truth or Falsity of the Oath of Joint Inventorship.

The proofs presented by defendant fail to overcome the presumption that arises from the facts (1) that all three of the inventors joined in that oath on April 20, 1909, (2) that the patent issued on the basis of that oath, (3) that no one of the three inventors questions its truth now or asserts its falsity, and (4) that no one representing any one of them or representing any interest derived from any one of them questions its truth or asserts its falsity. The defendant does not derive title from either Sulman, Greenway or Higgins or in any way represent them or any interest derived from them.

Moreover the British patent No. 26,852 of 1908 was not for the same invention as the patent in suit but was for a species where the latter is for the genus, nor does it disclose or cover what the defendant is doing, and the same thing exactly is true of British patent No. 28,173 of 1908.

The defense is purely technical and does not present a scintilla of merit as explaining or justifying defendant's course in infringing the patent in suit.

DeLaski v. *Thropp*, 218 Fed. 458, 464 and 226 Fed. 941, 947;
Worden v. *Fisher*, 11 Fed. 505, 506-9;
Consolidated v. *Woerle*, 29 Fed. 449;
Carter v. *Perry*, 8 O. G. 518, Com. Dec. 1875, p. 111;
Collins v. *Coes*, 8 Fed. 517;
Schlicht v. *Chicago*, 36 Fed. 585, 587.

Under these circumstances the burden of proof that rests upon the defendant to establish to the full and complete satisfaction of the Court the fact of the falsity of the oath of joint inventorship is unusually heavy and that burden is not met by the proofs.

Defendant's contention amounts to a charge of fraud by Sulman, Greenway and Higgins and Minerals Separation, Limited (the assignee) upon the public and upon the defendant.

A Heavy Burden of Proof is Upon Him Who Alleges Fraud.

Fraud is never presumed but it must be proved by the party who alleges it and it must be proved clearly. (*Farrar* v. *Churchill,* 135 U. S. 609; *Schreyer* v. *Scott,* 134 U. S. 405; *Gaines* v. *Nicholson,* 9 How. 356; *Jones* v. *Simpson,* 116 U. S. 609.)

In particular the defense of the falsity of an oath of joint inventorship has always been looked upon with disfavor by the courts and the burden of proof put upon a defendant alleging it has always been a heavy one.

A Particularly Heavy Burden of Proof is Upon Him Who Alleges the Falsity of an Oath of Joint Inventorship.

Judge Lurton, speaking for the Sixth Circuit Court of Appeals in *Quincey* v. *Krause,* 151 Fed. 1012, 1017, said:

> "To destroy a patent granted for a joint invention, upon the ground that it was the invention of only one of the patentees, would require very clear evidence of a very reliable character."

Judge Coxe in *Butler* v. *Bainbridge,* 29 Fed. 142, 143 said the defense that two persons to whom a patent has been issued were not in fact

> "joint inventors is so purely formal in character that it cannot be regarded with favor, unless it be shown that the action of the patentees in this regard was disingenuous, or calculated to mislead the defendants."

Judge Wallace, speaking for the Second Circuit Court of Appeals in *DeLaval* v. *Vermont,* 135 Fed. 772, said:

> "The Court below adjudged the patent invalid upon the ground that the defense that Melotte and Reuther were not the joint inventors was satisfactorily established. With this conclusion we are constrained to agree, though we do so with regret, because the defense is purely technical, and destroys a meritorious patent, purchased by the complainant in ignorance of its infirmity, and at a very considerable price."

Judge Woolley, speaking for the Third Circuit Court of Appeals in *Thropp* v. *DeLaski,* 226 Fed. 941, 949 refers to "the rule which requires unquestionable proof that joint patentees are not joint inventors."

Judge Coxe, speaking for the Second Circuit Court of Appeals in *United Co.* v. *Beattie,* 149 Fed. 736, 741, said of a similar situation:

> "The question is at best a technical abstraction. * * * A decision against Pine now will benefit infringers but will be no benefit to Dormandy. We think the testimony fails to establish the defendants' contention."

Robinson on Patents, pages 571, 572, note 1, protests against the harshness of the law which holds a patent invalid if the sole inventor has admitted someone else to a share therein as joint inventor with him and argues:

> "So far, therefore, as the public are concerned, there is no reason why the patent should be treated as invalid, if on any principle of law or equity the grant, as made, can be upheld. * * * Certainly his rights as sole inventor are not vindicated by declaring the entire patent void, and depriving him of his reward because he has improperly though honestly allowed another to obtain a share therein."

Walker on Patents, 5th Ed, page 65 §51, says:

> "But very convincing evidence is required to establish the invalidity of a patent on the ground stated in this section" [i. e., Joint invention where in fact there has been sole invention].

The question has arisen in various ways in many cases and the study of these cases where the question of joint or sole inventorship arose is interesting. But always the courts have hesitated to strike down and destroy a valuable piece of property because of a purely technical defense which could not possibly hurt or mislead any one and which did not in fact mislead the defendant into committing an infringement and which in no way induced or justified the infringement. The courts constantly seek to reconcile the evidence with the oath on which the grant is based and only declare the grant invalid and void where the evidence is clear and convincing and the facts indubitably proved are necessarily inconsistent with the basis of the grant.

The attitude of the Patent Office is well indicated in the following:

In *Carter* v. *Perry,* 8 O. G. 518, 519, C. D. 1875, 111, 114, the Commissioner of Patents, where two of the parties before him had in their application for patent made oath that they were joint inventors, said:

> "* * * I do not think I should be justified in going behind their oath, unless constrained by evidence perfectly clear and inexplicable on any other hypothesis than that of independent invention."

Decisions on the Question of Fact of Joint or Sole Inventorship in Particular Cases.

A careful search of all the published authorities in this country has disclosed to us only four cases during a period of more than one hundred years in which a patent that had issued as for a joint invention was declared invalid on the ground that the invention was not in fact joint.*

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* In *DeLaval Separator Co.* v. *Vermont Farm Machine Co.,* 135 Fed. 772, the defense (that the invention was not in fact joint) was held proved and the patent was declared invalid though with reluctance.

In *Stewart* v. *Tenk,* 32 Fed. 665, the defense was held proved as to one claim out of twelve.

In *Heulings* v. *Reid,* 58 Fed. 868, the defense was sustained but at the same time the defense of non-invention was also sustained.

In *The Union Bag Machine Co.* v. *The Atlas Bag Co.,* 6 Fed. 398, the defense was sustained but a defense of prior use was at the same time sustained.

In one other case, namely, *Welsbach Light Co.* v. *Cosmopolitan Incandescent Light Co.,* 104 Fed. 83, a preliminary injunction was denied because of doubt on the question of joint inventorship.

On the other hand this investigation has disclosed twenty-four cases in which the defence was made but was overruled as not proven.**

A study of all these cases and of the sort of evidence considered by the courts and held sufficient or insufficient as the case might be to establish the defense, will deeply impress the student of the subject with the fact that such a defense can only prevail upon the clearest and most convincing sort of evidence. Such evidence is wholly lacking in this case.

The Second Defense, i.e., of prior patenting and/or prior inventing by Sulman.

What Respondent's Brief calls the second defense, namely, alleged (1) prior patenting by Sulman by patent No. 955,012 and/or (2) prior invention by Sulman, is even more technical than the defense just discussed and is fully answered by the facts that we have set forth.

** *American Patent Diamond Dop Co.* v. *Wood*, 189 Fed. 391;
Ashcroft v. *Cutter*, Fed. Cas. No. 578; 6 Blatchf. 511;
Armat Moving Picture Co. v. *American Mutoscope Co.*, 118 Fed. 840;
Belle Patent Button Fastener Co. v. *Lucas*, 28 Fed. 371;
Butler v. *Bainbridge*, 29 Fed. 142;
Cheshire v. *Cox Multi-Mailer Co.*, 229 Fed. 415;
Consolidated Bunging Apparatus Co. v. *Woerle*, 29 Fed. 449;
Coburn v. *Schroeder*, 8 Fed. 521;
DeLaski & Thropp Co. v. *Thropp & Sons Co.*, 218 Fed. 458 (affirmed 226 Fed. 941);
Gottfried v. *Phillip Best Brewing Co.*, 5 Ban. & A. 4, Fed. Cas. No. 5633;
Hoe v. *Kahler*, 12 Fed. 111;
Hotchkiss v. *Greenwood*, 4 McLean 456, Fed. Cas. No. 6718;
Minerals Separation, Ltd. v. *Hyde*, 207 Fed. 956; 242 U. S. 261;
Priestley v. *Montague*, 47 Fed. 650;
Quincey Mining Co. v. *Krause*, 151 Fed. 1012;
Sterns v. *Barrett*, Fed. Cas. No. 13337; 1 Mason 153;
Selectasine Patents Co. v. *Prest-O-Graph Co.*, 267 Fed. 840 (affirmed 276 Fed. 260, C. C. A. 9);
Sieber & Trussel Mfg. Co. v. *Chicago Binder & File Co.*, 177 Fed. 439;
Schlicht & Field Co. v. *Chicago Sewing Machine Co.*, 36 Fed. 585;
Slemmer's Appeal, 58 Pa. St. 155;
The Collins Co. v. *Coes*, 8 Fed. 517;
Vrooman v. *Penhollow*, 179 Fed. 296;
Worden v. *Fisher*, 11 Fed. 505;
Scherzer Bridge Co. v. *Chicago*, 2 Fed. (2d) 601, affirmed by C. C. A. 7. 11 Fed. (2d) 605.

It is based on the fact that Minerals Separation, Ltd., besides patenting the generic invention in the United States, elected also to patent in the United States the Sulman contribution toward that generic invention, i. e., the process using the "alcohols" species. But it is quite clear that this was accomplished without forfeiting any rights.

As to *prior patenting* by patent No. 955,012, it is true that that patent issued a few weeks before patent No. 962,678, namely, on April 12, 1910 (D. Ex. 71, R., Vol. II, pp. 1058-1062) whereas patent No. 962,678 did not issue until June 28, 1910. But the invention of the latter was made long prior to April 12, 1910, as evidenced for one thing by the fact that the application for that patent No. 962,678 was filed on April 30, 1909. So 955,012 was not a *prior patent.** Indeed the application for 955,012 was not filed until November 22, 1909.

As to *prior invention* by Sulman, Sulman was not a stranger to the patentees but was one of them. Therefore the defense of prior invention by him disappears altogether, because his thoughts and acts that respondent stands on in that connection were a part of Sulman's constructive work and contribution toward the generic invention, and give date to that generic invention as much as to any specific invention. No part of that work was prior art to any other part.

Moreover the generic invention had, prior to December 24, 1908 (the date of filing of the Provisional Specification No. 28,173 of 1908), been reduced to practice in England, as we have seen, and as early as December 8, 1908, and in other specific forms than those ascribed to Sulman on December 24th, 1908. So that, as to the latter—the specific "alcohols" process invention of patent No. 955,012—, the generic invention in some of its forms (e. g., the carbolic acid, that is, the phenol process) was prior instead of the reverse.

Therefore the *Milburn* case and the *Yeast* case cited on pages 61 and 62 of Respondent's Brief have no bearing whatever on

* *Bates* v. *Coe*, 98 U. S. 31; *Dubois* v. *Kirk*, 158 U. S. 58, 64; *Anderson* v. *Collins*, 122 Fed. 451, 458 (C. C. A. 8).

the facts of the present case, and the argument made on pages 59 to 63 is wide of the mark.

Every related fact and circumstance in the case shows that the generic invention in suit—the joint invention of Sulman, Greenway and Higgins—was not anticipated by the specific invention which is the subject-matter of patent No. 955,012 and of its corresponding British patent No. 28,173 of 1908, and which specific invention was the sole invention of one of them, to wit, Sulman. This Sulman alcohol patent No. 955,012 is obviously *not an interfering patent* with No. 962,678, and so is for a different invention in the eyes of the law from that of No. 962,678, and in so far as it discloses and claims a froth-flotation process (claims 4, 5 and 6), it in substance *disclaims the generic invention of the patent in suit* by merely claiming the "alcohols" process species. The oath of Sulman, filed as part of the application for patent No. 955,012, executed November 9, 1909 (R., Vol. II, p. 1070), and filed November 22, 1909 (p. 1064), was that he was "the original, first, and *sole* inventor of the 'Improvements in the Concentration of Ores' described and claimed in the annexed Specification," to wit, the alcohol process. Before making that oath, as we have already pointed out, he had joined in the making and filing in the United States Patent Office of the joint oath of himself, Greenway and Higgins that they were "the original, first and *joint* inventors of the 'Improvements in Ore Concentration' described and claimed in the annexed Specification," to wit, the broad invention of claims 1 and 2 and other claims of the application for the patent in suit. By these two solemn acts Sulman put himself on record on April 30, 1909, as a joint inventor of the broad invention of the patent in suit, and on November 22, 1909, as the sole inventor of the alcohol process.

The burden was on respondent to clearly prove its allegation of prior invention by Sulman. This it has failed to do.

In the case of *Minerals Separation* v. *Hyde, supra,* defendant attacked inventorship and joint inventorship, issued an open commission to examine the inventors abroad, and adduced the testimony of the joint inventors and of Mr. Higgins, on which evidence this Court adjudged joint inventorship in the

patentees of patent No. 835,120. Defendant here could have proceeded similarly. Mr. Higgins, here one of the joint inventors, was in fact present at the trial under defendant's subpoena, although defendant elected not to examine him as its witness on any part of the case. He testified at large, however, for the plaintiff and was cross-examined at length. Defendant having failed utterly to make good its allegation of prior invention by Sulman and having examined Stevens and introduced all of Stevens' reports, plaintiff was under no duty to carry back the joint invention to the date which had been given in its bill of particulars, to wit, "on or about the first of May, 1908" (R., Vol. I, p. 91). December 8, 1908, was early enough. It anticipated the alleged anticipation.

The evidence relied upon by defendant as showing anticipation of the joint invention by the separate work of the joint inventors not only falls far short of proving any defense but is entirely consistent with the assumption that in the Spring and Summer of 1908 the three experimenters were in communication with one another and, both jointly and severally, attacked the problem of ore concentration *without the use of oils* under spur and compulsion of the Elmore litigation and pursued that work thereafter and with particular persistence and intensity from early December, 1908 (after Mr. Justice Fletcher Moulton's unfavorable decision of December 2, 1908), conceiving the broad invention and making contributions to it which separately considered might be regarded as separate and sole inventions but which, all taken together and as a whole, developed the broad and generic invention by the discovery and development and disclosure of the froth-flotation characteristic of soluble mineral-frothing agents in solution as a broad class characteristic and by the defining and delimiting of the metes and bounds of that class.

This would constitute Sulman and Greenway and Higgins joint inventors under the law of the broad invention of the patent in suit, and separate and sole inventors, perhaps, of some of their separate contributions if those also constituted separate patentable subject matter (with the patentability of their separate contributions we are not here concerned). But in

such event the separate contributions would not constitute prior art to the whole, first, because they were part of that whole and give date to it as much as they give date to themselves as separate achievements, and secondly, because the ultimate achievement necessarily and inevitably implied a corresponding original purpose and conception preceding and underlying all their efforts and all their contributions to it. And the oath made by Sulman, Greenway and Higgins on April 20, 1909, in connection with the application for the patent in suit, that they were joint inventors of the broad invention there set out and claimed, makes it a reasonable and indeed a necessary conclusion to reach on the whole evidence that the three collaborated together in making the broad invention and so were joint inventors and that the separate contributions of each did not anticipate the joint whole.

No defense of abandonment or dedication of the generic invention by Minerals Separation, Ltd. can be deduced from, or predicated upon, its efforts to patent that invention, and all its patentable parts, in England and in the United States, that have been recited above, for everything done by it and by Sulman, Greenway and Higgins, or any of them, prior to April 30th, 1909, was secret. The public and the respondent acquired no knowledge and no rights from it either here or in England.

Suffolk Mfg. Co. v. *Hayden*, 3 Wall. 315;
Century Co. v. *Westinghouse Co.*, 191 Fed. 350 (C. C. A. 8);
Higgins v. *Watson*, 263 Fed. 378, 385 (C. C. A. 6);
Thomson-Houston v. *Ohio*, 80 Fed. 712, 724 (C. C. A. 6);
Victor v. *Brunswick*, 286 Fed. 334, 336 (C. C. A. 6);
Ide v. *Trorlicht*, 115 Fed. 137, 145 (C. C. A. 8);
Anderson v. *Collins*, 122 Fed. 451 (C. C. A. 8);
Thomson-Houston v. *Elmira*, 71 Fed. 396, 404 (C. C. A. 2).

FOURTH DEFENSE.

The fourth defense in substance is that the claims in suit are void because they are not limited to an acidified pulp as are other claims in the patent in suit.

The questions to be considered are (1) what was the real invention disclosed by the patent in suit—what was its contribution to the art—and (2) are the claims in suit broader than that real invention, that contribution to the art?

The contribution to the art made by the process in suit was not an acidified pulp. That was old in all sorts of processes employing oils. It was first disclosed in the Everson patent issued in 1886. It was the principal feature of the one Elmore oil-buoyancy patent on which the case of *British Ore Concentration Syndicate, Ltd.* v. *Minerals Separation, Ltd.*, 27 R. P. C. 33, was decided by the House of Lords. It was the principal feature of the corresponding Elmore Australian patent on which the case of *Ore Concentration Company (1905), Ltd.* v. *Sulphide Corporation, Ltd.* (a licensee of Minerals Separation, Ltd.), 31 R. P. C. 206, 222, was decided by the Privy Council of the British Empire. It was disclosed in the Cattermole patents and was not only disclosed in patent No. 835,120 but was extensively used in the great operations in Australia wherein that process was being carried on up to and at the time of the invention of the process in suit. Prior to the invention of the process in suit there were no operations with oil in which an acidified pulp was not used. Patent No. 835,120 disclosed only one example of the carrying on of the process of that patent and that was with an acidified pulp, and an acidified pulp was recited as a limitation in eight of its thirteen claims. In the *Hyde* case claims not limited to an acidified pulp (1, 5 and 12) were held valid and infringed and claims limited to an acidified pulp (2, 3, 6 and 7) were also held valid and infringed. In the *Butte & Superior* case the same claims were held valid and infringed, and additionally claims 9 and 10 (not limited to an acidified pulp), as well as claim 11 (limited to an acidified pulp) were, as limited by disclaimer, held valid and infringed. Thus in that case the same argument of lack of disclosure in patent No. 835,120 could have been made as is made in Respondent's Brief herein as to patent No. 962,678, since there was no *disclosure* in 835,120 of any procedure wherein an acidified pulp was not used. In that patent as in the patent in suit, claims not limited to an acidified pulp were

associated in the same patent with claims limited to an acidified pulp, and in the *Hyde* and *Butte* suits, as stated, claims of both sets were in issue and were held valid and infringed. The fact that the Specification of 835,120 refers to the use of an acidified pulp as preferential is not a disclosure of a process wherein acidified pulp is not used. In legal effect it is merely a suggestion in the specification of a differentiation that is definitely made in the claims. Such a suggestion in the specification is not required by law as a prerequisite to such a differentiation in the claims. The whole document is a unit and it is the function of the claims (and not necessarily also the function of the specification) to point out what part of the whole disclosure is new.

The question of the validity of claims 1 and 2 of the patent here in suit was acutely presented in the *Miami* case to the Circuit Court of Appeals for the Third Circuit, for the reason that the defendant there did not use an acidified pulp, and for the further reason that the Greenway patent No. 1,099,699 (from the file of which Respondent's Brief quotes at great length, pp. 73-77) was also before that court for adjudication on an allegation by the defendant there that it was anticipated by the patent here in suit No. 962,678, and was held by that court to be valid and infringed (244 Fed. at 774, 775) reversing the trial Court.

In the opinion of the Circuit Court of Appeals for the Third Circuit, Judge Woolley said relative to the disclosure of the patent here in suit and claims 1 and 2 thereof (*Minerals Separation, Ltd.* v. *Miami Copper Co.*, 244 Fed. at 773):

> "We may also note that while the addition of an acid to the mineral-frothing agent is described as part of the process, this was at that time a usual practice, and in any event is not an element in the claims now in issue."

Judge Peters in the instant case said as to the same subject (R., Vol. I, pp. 623, 624):

> "It was widely understood at that time [when the process in suit was invented] that nothing but an acid proc-

> ess would work in their concentration process, and it was the general custom to use an acidified pulp. This, however, was not a part of the contribution by the patentees to the flotation art. What they contributed was a process of froth-flotation employing a mineral-frothing agent in solution. Even if the patentees did not know that the process described by them could be carried on with an alkaline pulp, they did not limit themselves in that respect and it is sufficient if the real novelty of their invention is broad enough to support the claims, as it appears to be."

In view of the fact that the patent in suit is a process patent, we cite the definition by this Court (Mr. Justice Bradley) of a patentable process (*Cochrane* v. *Deener*, 94 U. S. 780, 788):

> "A process is a mode of treatment of certain materials to produce a given result. It is an act, or a series of acts, performed upon the subject-matter to be transformed and reduced to a different state or thing. If new and useful, it is just as patentable as is a piece of machinery. In the language of the patent law, it is an art. The machinery pointed out as suitable to perform the process may or may not be new or patentable; whilst the process itself may be altogether new, and produce an entirely new result. The process requires that certain things should be done with certain substances, and in a certain order; but the tools to be used in doing this may be of secondary consequence."

Acidification of the pulp as generally practiced at the time of the invention of the process in suit and as practiced to some extent today, is for a definite purpose. Sulphuric acid is generally used and it acts "as a gangue-corrective" (Chapman, R., Vol. I, p. 558, Q153; p. 559, Q155). As we show in Petitioner's Brief (pp. 51, 52), of the eighty licensees of the plaintiff whose reagents are proved, seven of them acidify their pulps, in each case with sulphuric acid. The metallurgist uses acidification where it is advantageous or required as a gangue-corrective and refrains from its use and the expense of its use whenever the nature of the ore or the practical conditions of treatment permit.

We come now to consider what the patentees of the patent in suit contributed to the art of ore concentration—what was their real invention. They contributed, as Judge Peters said,

> "a process of froth-flotation employing a mineral-frothing agent in solution."

It was not the first process of froth-flotation. That had been contributed by the process of patent No. 835,120, but that process was achieved by employing an oil, fatty acid or other substance having a preferential affinity for metalliferous matter over gangue, used in a proportion which was a fraction of 1% on the ore, and acting to coat the metalliferous mineral particles and attain a mineral-bearing froth in that way. The process of the patent in suit is a second and a different process of froth-flotation, achieved through the employment of a mineral-frothing agent in solution which stays in solution and attains a mineral-bearing froth in that way. As we point out in Petitioner's Brief, that process is fully described in the Specification in one form (P. B., pp. 26-37) and is distinctly claimed in the claims in issue in every form (P. B., pp. 37-39).

The applicable Statute is as follows (U. S. C. Tit. 35, Sec. 33; R. S. Sec. 4888):

> "Sec. 33. *Application for patent; description; specification and claims.* Before any inventor or discoverer shall receive a patent for his invention or discovery he shall make application therefor, in writing, to the Commissioner of Patents, and shall file in the Patent Office a *written description of the same, and of the manner and process of* making, constructing, compounding, and *using it,* in such full, clear, concise, and exact terms as to enable *any person skilled in the art* or science to which it appertains, or with which it is most nearly connected, *to* make, construct, compound, and *use the same;* and in case of a machine, he shall explain the principle thereof, and the best mode in which he has contemplated applying that principle, so as to distinguish it from other inventions; *and he shall particularly point out and distinctly claim the part, improvement, or combination which he claims as his invention or discovery.* The specification and claim shall be signed by the Inventor."

Claims 1 and 2 of the patent in suit "point out and distinctly claim" what the patentees broadly claim as their "invention or discovery." They follow a specification which gives a written description of the process and of the manner of using it, "in such full, clear, concise, and exact terms as to enable any person skilled in the art * * * to * * * use the same." The specification and claims are addressed to the man skilled in the art. Claims 1 and 2 define and measure the invention in its broad scope and are not limited by the specification to the specific examples thereof.

In *Tilghman* v. *Proctor,* 102 U. S. 707, 732, this Court said:

> *"The patentee showed one method in which the heat could be applied.* That was all that was necessary for him to do. If it could be applied in any number of different methods, it would not affect the validity of the patent as a patent for a process."

As this Court has said "the claims measure the invention" and the "description does not necessarily limit the claims." We cite here *Continental Paper Bag Co.* v. *Eastern Paper Bag Co.,* 210 U. S. 405, wherein the invention was a machine and under the second part of the statute the patentee was called upon to explain the principle of his invention and the best mode in which he has contemplated applying that principle. The present invention being a process the first part of the statute applies and the particular requirements provided for the "case of a machine" do not apply, and so it is enough that the specification describes the manner and process of using the invention, in one workable example (which was demonstrated at the trial), and that the claims point out and distinctly claim that part of what is described which the patentees assert to be their invention or discovery. In the cited case, *Continental Paper Bag Co.* v. *Eastern Paper Bag Co., supra,* this Court (Mr. Justice McKenna) discussing the specification and claims of a patent there in suit for a machine, said (p. 418):

> "he filed a description of his invention, explained its principle, and the best mode in which he 'contemplated

> applying that principle' and did not intend to give up all other modes of application. An inventor must describe what he conceives to be the best mode, but he is not confined to that. If this were not so most patents would be of little worth. 'The principle of the invention is a unit, and invariable; the modes of its embodiment in the concrete invention may be numerous and in appearance very different from each other.' 2 Robinson, Patents, Sec. 485. The invention, of course, must be described and the mode of putting it to practical use, *but the claims measure the invention.* They may be explained and illustrated by the description. * * * *the description does not necessarily limit the claims."*

Obviously as to the process patent here involved the same general rules as to claims apply, the claims measure the invention and the description does not necessarily, and in this instance does not in fact, limit the claims.

FIFTH DEFENSE.

The fifth defense is in substance that the claims in issue are not infringed because as a matter of construction they must be limited by the specification to a process employing an acidified pulp; and defendant's pulp is not acidified. Respondent's Brief considers together this defense and the Fourth defense (R. B., pp. 69-81) and it is obvious that if the claims are valid as made and point out and measure the real invention and the defendant's process is such a process as is pointed out in the claims, the defendant infringes. There is little, therefore, to add since in Petitioner's Brief under the heading of Infringement (pp. 127-130) the process employed by the defendant is fully described, and it is shown that not only is this process the process precisely pointed out in the claims in issue, but that it is also a process describable in the language of the specification (P. B., p. 129), the alkali in the pulp being, with Respondent's ore, the equivalent of the acid as a gangue-corrective.

As to the solubility of the mineral-frothing agent used by the defendant, alpha-naphthylamine or X-cake, it is to be noted that Respondent's Brief makes the following admission (R. B., p. 79):

"In defendant's practice there is added to the ore pulp a small quantity of a mineral-frothing agent which goes wholly into solution in the pulp."

It is a general rule of construction, applicable where there are several claims, that if some of the claims are limited to details others which are not so limited are not to be fettered by insisting that they contain, as necessary elements, particulars which are specifically covered elsewhere. This language is taken almost exactly from *Bresnahan* v. *Tripp Giant Leveller Co.*, 102 Fed. 899, 900 C. C. A. 1.*

Defendant's attempted justification under the Corliss patent No. 1,228,183. Defendant is licensed under this patent, Defendant's Exhibit 126 (R., Vol. II, p. 1222), which discloses a froth-flotation process employing in solution the organic mineral-frothing agent alpha-naphthylamine, commonly known as X-cake.

This Corliss patent does not assert for X-cake in the process any new or different mode of operation or principle of action nor any new result. It is an old and well known organic substance, known to be wholly soluble in the proportions in which it would be used in froth-flotation concentration. It has been found to be a good mineral-frothing agent in solution. Obviously its use is within the scope of the claims in issue. Every generic patent is the foundation for development and improvement, and it is reasonable to expect that the industry of metallurgists in carrying on with different ores the simple tests described in the patent in suit will result in the discovery that substances not specifically named in the patent but within the broad class there described are capable of use in a froth-flotation process as mineral-frothing agents in solution. The propo-

* See also
Parsons v. *Seelye*, 100 Fed. 455, 457, C. C. A. 1;
Cadillac Motor Car Co. v. *Austin*, 225 Fed. 983, 985, C. C. A. 6 (Judge Denison);
City of Akron v. *Bone*, 221 Fed. 944, 946, C. C. A. 6 (Judge Denison);
Automatic Recording Safe Co. v. *Burns Co.*, 231 Fed. 985, 987, C. C. A. 2;
Ryder v. *Schlichter*, 126 Fed. 487, 491, C. C. A. 3;
National Cash Register Co. v. *American Cash Register Co.*, 53 Fed. 367, 370, C. C. A. 3.

sition that such a discovery would carry the substance outside of the patent and would as to that substance take away from the patentees of the broad process their rights under their patent should not receive serious consideration.

In the case of *Tilghman* v. *Proctor*, 102 U. S. 707, this Court (Mr. Justice Bradley), passing upon the question of infringement, stated (p. 731):

> "Or, if the mode of effecting the continued mixture adopted by the defendants should be deemed a new and useful improvement, they might perhaps have a patent for that peculiar device without being entitled to use Tilghman's process, on which it is but an improvement."

The doctrine stated above has been widely followed.*

Again, infringement is not avoided by using an improved or a better reagent.

In *Smith* v. *Nichols*, 88 U. S. 112, this Court (Mr. Justice Swayne) said:

> "A patentable invention is a mental result. It must be new and shown to be of practical utility. Everything within the domain of the conception belongs to him who conceived it. *The* machine, *process* or product *is but its material reflex and embodiment.* A new idea may be ingrafted upon an old invention, be distinct from the conception which preceded it, and be an improvement. In such case it is patentable. The prior patentee cannot use it without the consent of the improver, and the latter cannot use the original invention without the consent of the former."

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* See

Herman v. *Youngstown Car Mfg. Co.*, 191 Fed. 579 (C. C. A. 6).
Century Electric Co. v. *Westinghouse Electric & Mfg. Co.*, 191 Fed. 350, 363 (C. C. A. 8).
Simplex Window Co. v. *Hauser Reversible Window Co. et al.*, 248 Fed. 919 (C. C. A. 8).
General Electric Co. v. *Cooper Hewitt Electric Co.*, 249 Fed. 61, 66 (C. C. A. 6) 1918.
Ashley et al. v. *Weeks-Numan Co.*, 220 Fed. 899, (C. C. A. 2) 1915.
Jay v. *Ireland & Matthews Mfg. Co.*, 280 Fed. 166, 173, D. C. E. D. Michigan, S. D. 1922.
Ries, et al. v. *Barth Mfg. Co.*, 136 Fed. 850, 853, 854 (C. C. A. 7).
General Electric Co. v. *Electric Controller*, 243 Fed. 188 (C. C. A. 6).

In *Cochrane* v. *Deener,* 94 U. S. 780, this Court (Mr. Justice Bradley) stated the rule of law as follows:

> "The defendants admit that the process has produced a revolution in the manufacture of flour; but they attribute that revolution to their improvements. It may be as they say, that it is greatly due to these. But it cannot be seriously denied that Cochrane's invention lies at the bottom of these improvements, is involved in them, and was itself capable of beneficial use, and was put to such use. It had all the elements and circumstances necessary for sustaining the patent, and cannot be appropriated by the defendants, even though supplemented by and enveloped in very important and material improvements of their own."

SIXTH DEFENSE.

This defense (R. B., pp. 81-90) is, in substance, that the claims in issue are not infringed because they are limited "to a process in which the froth *is formed by agitation,*" whereas respondent alleges that it uses a "process in which the froth is *not formed by agitation.*" The answer to this is that the froth in defendant's process *is* formed by agitation within the meaning of the claims in issue, and more specifically that the agitation present in defendant's process is operative to bring the metalliferous mineral particles into contact with the air bubbles (introduced through the bottoms of the cells) so that the mineral particles become attached to the air bubbles and are lifted by the air bubbles up through the pulp, and that these air bubbles so laden with mineral particles form a mineral-bearing froth above the surface of the pulp.

The statement of Respondent's Brief (p. 85) that in the defendant's process "the froth is formed without other agitation than the mere upward movement of the bubbles through the pulp" is not in accordance with the demonstrated facts. It was demonstrated that in defendant's flotation apparatus—Callow cells—there was actually present a very vigorous agitation with cross-currents, overlapping currents and shifting vortices.

Judge Peters, who saw the demonstrations, held, as we shall show, that defendant's froth is formed by agitation as required by the claims in issue.

Plaintiff erected in Boston * a small mill-size demonstration plant in which defendant's process was repeated in the presence of the trial Judge, and the conclusions of the trial Judge expressed in his opinion are based in part on his actual observations of those demonstrations. We quote from Judge Peters' decision his general description of the process as follows (R., Vol. I, p. 625):

> "The defendant's process is the Callow cell process, using a tank with a canvas or porous bottom through which air under pressure is forced into the pulp body contained in the tank. In this way myriads of small air bubbles are formed throughout the liquid mass and finally accumulate at the surface in the form of froth bearing the minute particles of mineral. *From actual observation of the process, as well as otherwise, I am convinced that the froth is formed by the agitation induced by the compressed air liberated in the mixture through the porous bottom;* that is to say, by the agitation in combination with the frothing agent which always has to be present. One is as important as the other."

This demonstration plant is fully described in the Record (pp. 125-129, Qs85-99). The Callow cells had glass sides so that the agitation within them was visible. The cells are shown in drawings, Plaintiff's Exhibits 12 and 13 (R., Vol. II, pp. 687-689), and the complete plant in Plaintiff's Exhibit 14 (R., Vol. II, p. 691). The drawings are described (Wilding, R., Vol. I, pp. 130-132, Qs108-125) as well as the blowers used to supply the compressed air (pp. 132, 133, Qs126-129). It appears that the volume of air delivered and the agitation caused thereby in these demonstrations were slightly less than in defendant's actual operations (R., pp. 153, 154, XQs249-252; pp. 162, 163, RDQs318-320).

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* Boston having been selected for the convenience of the Circuit Court of Appeals for the First Circuit when the case should have reached that court; although when that happened they declined repeated invitations to view the demonstrations.

It was stipulated that the ore used was defendant's ore, supplied by it (R., Vol. I, p. 133), and that the X-cake (alpha-naphthylamine) and lime used were also specimens received from the defendant. This ore was crushed, lime was added, the X-cake was dissolved, and defendant's operations were reproduced. Mr. Wilding generally describes this operation and the agitation produced in the cells (p. 138, Qs157, 158), and further describes the carrying on at the same time of the same operations in another of the glass-sided Callow cells with everything reproduced except that the ore was not present (pp. 138-139, Qs160-162). Here the vigorous agitation in the cell was plainly observable by reason of the removal of the obscuration caused by the opacity of the ore pulp. This vigorous agitation was plainly seen, with a general current of circulation across and up and across and down, overlapping currents, and irregularities and small vortices changing rapidly (p. 139, Qs163-166). These demonstrations were made in presence of Judge Peters.

An effort was made in behalf of the defendant to show that the very apparent vigorous agitation was the result of what defendant's witnesses called "dead space" at the deeper or outlet end of the cell, Taggart, R., Vol. I, p. 264, 265, Qs163-166; Yerxa, pp. 322, 323, Qs56-60), but it was shown, at the demonstrations before Judge Peters, by elimination of the so-called dead space, that this contention was groundless (Higgins, R., Vol. I, pp. 462, 463, Qs290-294).

Mr. Higgins also testified that these operations in the presence of the Court in the glass-sided Callow cell with the defendant's ore, lime and mineral-frothing agent, were in his opinion the same as those described in the stipulation as to defendant's operations (R., Vol. I, p. 464, Qs297, 298).

We here quote from Judge Peters' opinion (R., Vol. I, pp. 624, 625):

> "It remains to consider the position of the defendant that 'the claims are not infringed by the defendant's process because the claims were deliberately limited by the patentees to the agitation froth process, *i. e.*, a process in which the froth is formed by agitation, and the

defendant uses the pneumatic-flotation process in which the froth is not formed by agitation.'

The defendant's statement of this matter of defense, as above quoted, involves a characterization of the plaintiff's process as 'the agitation froth process' and the statement of fact that in the pneumatic process used by the defendant 'the froth is not formed by agitation.' If by that description of the plaintiff's process is meant one whereby the froth is formed by agitation as contrasted with a process where the froth is formed otherwise than by agitation, the characterization is apparently accurate and without ambiguity. The plaintiff's process comprises three essential parts, (1) mixing the powdered ore with water containing in solution a frothing agent, (2) agitating the mixture to form a froth, and (3) separating the froth. The process is undoubtedly an agitation froth process. The claim limits it to an agitation froth process, with no limitations on the kind of agitation.

Upon the evidence, however, *I am unable to agree with the statement that in the defendant's process,*—the alleged infringing process,—*the froth is not formed by agitation.* The evidence of the process, its exemplification by the experiments in Boston for the benefit of the Court, and common-sense reasoning from known facts, *point conclusively to the contrary.*"

Then follows Judge Peters' description of the Callow cell operations above quoted, including a further statement of his conclusions, here repeated, and his further discussion of this defense (R., Vol. I, p. 625, 626):

"*From actual observation of the process, as well as otherwise, I am convinced that the froth is formed by the agitation induced by the compressed air liberated in the mixture through the porous bottom;* that is to say, by the agitation in combination with the frothing agent which always has to be present. One is as important as the other.

In the trial of the case this particular defense of non-infringement appeared to be based not so much on an agitation process, as it was on mechanical agitation as against pneumatic agitation. It can hardly be claimed that there is not agitation in both processes. The me-

chanical agitation is apparently more violent, but may not be more pervasive than the agitation caused by compressed air. At least each is effective for the purpose and I think it cannot be successfully claimed that frothing would take place without one or the other.

Patent No. 835,120, called the first patent above, being the patent that required the use of oil, is the patent that features the mechanical agitation, which was required to be of considerable intensity and duration to disseminate the minute amount of oil throughout the mixture. In any soluble frothing agent process less agitation would be required *as the agent tends to disseminate itself.* The agitation in the defendant's process is caused by compressed air let into the pulp. The question is simply whether the claims in the patent in suit are broad enough to cover that method of agitation. It would seem that the question answers itself, because the language is 'agitating the mixture to form a froth.' I can see no reason why the language should not receive its ordinary, natural meaning and be construed like the language of any contract. Its terms are perfectly plain and unambiguous."

Judge Peters then cites authorities in support of his construction of the language of the claims in issue and then gives a further statement of his conclusions as to this sixth defense (R., Vol. I, p. 627):

"I can find no satisfactory foundation for the defendant's theory that the words in the claims, 'agitating the mixture to form a froth,' have any special or recognized significance to one skilled in the art, or that the words carry back to the agitation froth process of patent No. 835,120, and exclude other froth flotation processes.

Indeed, this construction is negatived by the very language of the defendant in stating this 'seventh defense' [now sixth defense], where it is said that the claims (1 and 2) were limited to 'the agitation-froth process, *i. e., a process in which the froth is formed by agitation.*' That is what I find it to be, that and nothing less, and that, by the plain meaning of the language, covers agitation to form the froth whether caused by stirring with a paddle or stirring with compressed air. In both cases air is introduced into the mixture, and has to be, to make it froth. As was said by Prof. Taggart, expert witness for defendant, in an article he wrote on the sub-

ject before he was connected with the case, *'the only difference is in the method of introducing air.'* *

I find that the defendant's process in this respect also is fairly covered by the plaintiff's claims, and is an infringement."

These conclusions as to the facts and the law, undisturbed by the opinion immediately below, which did not discuss the question of infringement, would seem to leave no further question for consideration; but Respondent's Brief injects into the sixth defense one of the disproved theories of defendant's expert Professor Taggart, in calling this operation of the process in the defendant's Callow cells (R. B., p. 81) "the pneumatic bubble column flotation process."

The bubble-column theory. This theory, as put forth by Professor Taggart, is that in defendant's Callow cell there is no attachment in the pulp of the metalliferous mineral particles to the air bubbles, that mineral and gangue particles are indifferently entangled with the bubbles as they rise out of the pulp, and that the separation is effected by a differential falling action in the froth itself after it is formed, the metalliferous mineral particles falling less rapidly through the froth than the gangue does in relation to the uprising bubbles. This is contradicted by two of the patents under which defendant is licensed, the Callow patent for the Callow cell and the Towne & Flinn patent (which is the so-called bubble column patent) as we shall show. It is also contradicted by Professor Taggart himself in a published description written before he became connected with flotation litigation. This article was published by him in 1916 in collaboration with Professor Beach, but was apparently written by Taggart (Taggart, R., Vol. I, pp. 301, 302, XQs371-372). The following is quoted from the article (R., Vol. I, pp. 302, 303, XQs376, 377):

"Pneumatic Froth Process.

"Sulphide [metalliferous mineral] and gangue minerals mixed with water and oil, with or without acid,

* The relevant parts of Taggart's published statement here referred to and partly quoted by Judge Peters appear in full on this and the following page.

are run into a tank with a porous bottom through which air is forced. The air bubbles rise to the surface with a coating of solid particles, preponderantly sulphide, while the gangue particles sink.

"The principles involved in this method are the same as explained in the agitation-froth process. *The only difference is in the method of introducing air.* The result of this difference is that the bubbles in the pulp are much larger than in the agitation-froth method. They arrive at the surface less heavily loaded in proportion to their weight. The bubble films are therefore less viscous and the froth less persistent."

And from another part of this article the following may be quoted (R., Vol. I, pp. 303, 304, XQs378-379):

> "But the *agitation of the pulp in the mechanical and pneumatic froth processes * * * are sufficient,* in their [the authors'] opinion, to *bring every sulphide particle into contact with a bubble film.* Once in contact, the preferential adhesion of the contaminated layer to a sulphide surface in the presence of water is sufficient to account for *the persistent attachment of the sulphides to the bubble films.*"

This article was a truthful statement of the facts and was written at a time when the witness held no "brief" for either side.

This is the article referred to by Judge Peters in the last above quotation from his opinion (*supra* pp. 53, 54).

Professor Taggart in putting forward his bubble-column theory in the present case says (R., Vol. I, p. 258):

> "in the pneumatic process, in the first place, there is no attachment of particles to the bubble in the pulp,"

This not only contradicts his own statement as to "the persistent attachment of the sulphides to the bubble-films" but is also contradicted in the so-called bubble-column patent to Towne & Flinn, No. 1,295,817, issued February 25, 1919, Defendant's Exhibit 127, under which, as stated, defendant is

licensed. Claim 1 of this patent (R., Vol. II, p. 1230) is as follows:

> "An ore-concentration process, which comprises the operations of charging a vessel with a flowing pulp consisting of crushed ore, water and a froth-producing and mineral-selecting agent, introducing a gas through a fine-texture porous medium into said ore pulp and forming *bubbles to which certain mineral particles of the ore adhere as said bubbles rise through the pulp*, causing said mineral-bearing bubbles to form a column of bubbles above the pulp, and separating the mineral carried by the bubbles in the upper part of the bubble column from the remainder of the ore."

Many other similar statements appear in that patent and in its voluminous file-wrapper and contents, Defendant's Exhibit 143 (in evidence, R., Vol. I, p. 576, physical exhibit) but the above quotation will be sufficient to make it quite clear that the patentees asserted that in the pulp the metalliferous mineral particles adhered to the air bubbles.

Taggart's present theory is also contradicted by the Callow patent for the Callow cell, No. 1,329,334, under which, as stated, the defendant is also licensed. It illustrates a Callow pneumatic cell of the same general type as that employed by the defendant, and clearly points out that the bubbles in the pulp unite with the metalliferous mineral particles there. This is stated, for example, in claim 15, wherein the language is (R., Vol. II, p. 1237, Spec., p. 5, lines 21-24):

> "causing the said bubbles to unite with the metalliferous particles and carrying them to the surface of the pulp mass,"

The file-wrapper and contents of this Callow cell patent is also in evidence (Pltf.'s Ex. 105, R., Vol. II, pp. 757-843) and as filed the specification made it quite clear that the process involved agitation to form a froth, quite contrary to the present theories of the respondent. The description of the operation that takes place in the Callow cell included the following statement (p. 762):

> "the *agitation of the pulp by air,* gas or vapor, which is admitted into the pulp in fine streams and under, preferably, substantially low pressure and which *acts upon the fluid contents of the pulp to cause the formation of a foam* or sud which successively rises to the surface of the pulp and overflows into an appropriate launder."

This description of the agitation to form a froth was further particularized as follows (p. 764):

> "air, gas or vapor, under pressure, in the cell below [air chamber], will escape in innumerable fine streams, or jets, this being for the purpose of *both aerating and agitating the pulp* in the compartment above [pulp chamber], the compressed air, gas, or vapor, becoming the medium of (1) aerating or charging the pulp with a desired volume of air, gas, or vapor, and (2) it likewise induces and *maintains an agitation or ebullition* of the pulp and the oily constituents thereof *and produces a froth* composed of bubbles of air, gas or vapor having an envelope or covering of oily matter, to which the mineral particles in the pulp have an affinity and will attach."

Another Callow patent under which defendant is licensed, No. 1,141,377 of June 1, 1915, Plaintiff's Exhibit 108, contains statements as to the *substantial equivalency of pneumatic agitation and mechanical agitation.* We will merely repeat the most striking part thereof (R., Vol. II, p. 855, Spec., p. 1, lines 70-77):

> "The compressed air thus becomes the medium of (1) fully aerating or charging the pulp with the desired volume of air, and (2) it likewise *induces and maintains that agitation of the pulp which heretofore was obtained by the mechanical propellers and stirrers before alluded to.*"

The apparatus shown and described in this patent was undoubtedly the precursor of the Callow cell. It lacks only the inclined bottom and single large vessel which tend to intensify the agitation.

Another Callow patent under which defendant is licensed, No. 1,125,897, Plaintiff's Exhibit 107, repeats the language just above quoted from patent No. 1,141,377 (R., Vol. II, p. 850, Spec., p. 1, lines 53-59), in describing the operation of the apparatus disclosed in Callow patent No. 1,141,377.

These last two patents were issued before the theories now put forth by Professor Taggart were evolved, and, like his own article, were free from the bias of interest and of controversy and, moreover, the facts stated in them were in the instant case actually demonstrated in the presence of the trial Court below.

The bubble-column theory of Professor Taggart is not only thus contradicted by himself and by the earlier patents under which defendant attempts to justify its infringing acts, but it is palpably and baldly erroneous. We will merely call attention, without discussion, to the evidence establishing this fact (Higgins, R., Vol. I, pp. 465, 466, Qs299-306; p. 474, Qs357-359).

Respondent's Brief appears to rely upon the decision of the Circuit Court of Appeals for the Third Circuit for argument supporting the assertion that agitation to form a froth does not occur in the Callow cell, and that in the Callow cell there is a "mere upward movement of the bubbles through the pulp" (R. B., p. 85). The quotations (R. B., pp. 86-89) are largely from the discussion in that opinion as to the kind of agitation which was required by the process of patent No. 835,120, wherein a very small quantity of an undissolved oily substance had to be disseminated through an ore pulp so as to preferentially coat the metalliferous mineral particles therein and then those so coated particles had to be brought into contact with air bubbles. There was unquestionably a difference of opinion among the Judges in that court as to the degree of agitation that was necessary for that purpose in the process of that patent No. 835,120, but the dissenting opinion of Judge Buffington did not go beyond that patent.

Again in that case the agitation in the Callow cell was preceded by agitation in three successive pieces of apparatus which were held in the majority opinion to themselves produce an

agitation sufficient to form the froth, whereas the defendant here omits all preliminary agitating apparatus. It is to be noted, however, that even in the discussion of the agitation of patent No. 835,120 and of this apparatus, Judge Woolley said (244 Fed. at 766):

> "We see no difference between the blow of a paddle and the blow of a blast of air as means to produce agitation."

and further said (*ib*)

> "When the critical quantity of the oil is used and fomentation is produced by agitation, which in degree of violence and in duration is substantially that of the patent, clearly it is indifferent whether it is attained by mechanical or other means, for the patent deals with agitation as a means of developing the discovery, not with means for developing agitation."

Judge Woolley in discussing this question of agitation as related to the patent here in suit No. 962,678, said (244 Fed. at 773):

> "The agitation is to be thorough, but in the same connection the *means for bringing this about is described in terms that are wide and inclusive.* The air or other gas is to be 'liberated in, generated in, or effectively introduced into, the mixture,' in order that the ore particles may come into contact with the gas and as a result may float to the surface in the form of a froth or scum which can be separated afterward by any known means. The object of introducing the air or other gas into the mixture is such agitation of the pulp as will produce the desired froth, but *the claims are not confined to a particular device or a particular degree of agitation.* But of course, the agitation must be thorough and it must be effective, these being matters for experiment but always with the ultimate object of bringing the sulphid particles to the surface and holding them there in the grasp of a froth."

As to the question of infringement of the patent here in suit No. 962,678, Judge Woolley finally said (244 Fed. at 774):

> "* * * The real question upon this patent also is the question of infringement, and here as well as there the decision turns upon the kind and degree of agitation employed by the defendant. We need not dwell upon the subject, for as the defendant used both processes conjointly it is evident that what has been said about the infringing agitation in the oil process [of patent 835,120] must also apply to the same agitation when considered in reference to the second process [of 962,678]. *There is this difference,* however; as pointed out above, *the agitation of the second process* [patent] *is so described as to cover expressly a wider range of means and degree* than is expressly covered by the first process [patent], and therefore needs less aid, *if any,* from the doctrine of equivalents. For the reasons given in discussing the oil patent, we think the defendant's practices there described infringe also the process now under consideration."

As to the *dicta* of Judge Woolley quoted in Respondent's Brief at page 86 and again on page 88 and finally conceded to be *dicta* at page 90, Judge Peters said (R., Vol. I, pp. 627, 628):

> "The Court certainly did use some expressions which indicated that it would not have considered the agitation of the Callow cells alone the equivalent of the violent agitation of the first patent (Patent 835,120 and not the patent in suit). But it did not pass upon the question whether the use of the Callow cell alone without other agitation would be an infringement of either patent."

Thus Judge Peters decided this question as the result of his own study and personal observation, and not under compulsion of the rule of comity.

In conclusion upon the question of infringement, it is submitted that the process of the patent in suit is an invention of prime importance and is pioneer in character and has enor-

monsly created and conserved wealth and materially advanced the arts, and that its claims are entitled to liberal construction under the rule of construction stated in *Eibel Process Co.* v. *Minnesota & Ontario Paper Co.*, 261 U. S. 45, 63, where this Court said:

> "In administering the Patent Law the court first looks into the art, to find what the real merit of the alleged discovery or invention is, and whether it has advanced the art substantially; and if it has done so, the court is liberal in its construction of the patent, to secure to the inventor the reward he deserves."

CONCLUSION.

In conclusion of the entire case we submit that all the defenses fail in the proofs and that the decree of the Circuit Court of Appeals for the First Circuit should be reversed and the decree of the District Court affirmed and the case remanded for further proceedings in accordance with that decree.

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Respectfully submitted,

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